

The Relationship between Working Memory Capacity and Executive Skills Among Employees

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ABSTRACT

Aim of the study to investigate the relationship between working memory capacity and executive skills among employees. Working memory capacity is the ability to hold raw information in immediate awareness so that it can be manipulated and transformed into a more useful form (Schneider and McGrew 2012) “Executive function are cognitive skills used to monitor, regulate mood, and behaviour, play and have mental flexibility, especially during complex and goal- tasks. (Miyake et al., 2000; van der Lely et al; 2009) Conducted a study on the relationship between working memory capacity and executive skills. The author mentioned that correlation between working memory capacity and executive function constructs was very strong but correlations between these constructs and processing speed were considerably weaker Controlling for working memory capacity or executive skills. The present study aims to identify the relationship between working memory capacity and executive skills among employees. 75 samples were collected based on random sampling methods. In order to collect the data regarding working memory capacity digit span test (Wechsler 1997) was used and for executive skill, Executive Skills Questionnaire (Peg Dawson and Richard Guare 2010) was used to collect the data The research formulates the hypothesis that there will be a significant relationship between working memory capacity and Executive skills. In order to test the hypothesis correlation is used. The result of the study concluded that there is a positive and significant relationship between variable (working memory capacity and Executive skills)

Keywords: Working Memory Capacity, Executive Skills

In today’s complex and demanding work environments, employees are constantly required to process large amounts of information, manage multiple tasks, and make quick, informed decisions. Central to these cognitive demands are working memory capacity and executive skills, two core cognitive functions that significantly influence an individual’s work performance. Working memory capacity refers to the ability to temporarily hold and manipulate information, a skill that is essential for tasks requiring active engagement, problem-solving, and multitasking. Executive skills, including cognitive flexibility, attention control, and impulse regulation, enable individuals to organize tasks, set priorities, and maintain focus, even in the face of distractions or high-pressure situations.

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These cognitive functions are critical for employees across various roles, from front-line workers to management, as they directly impact productivity, adaptability, and decision-making. In organizational contexts, high working memory capacity supports employees in handling complex information and adapting to new challenges, while strong executive skills facilitate efficient task management, error reduction, and collaboration. By understanding and fostering these cognitive abilities among employees, organizations can enhance individual performance, improve team cohesion, and drive overall success.

Meaning of working memory capacity

Working Memory Capacity is the ability to hold raw information in immediate awareness so that that it can be manipulated and transformed into a more useful form (Schneider & McGrew, 2012).

The term “working memory” was coined by Miller, Galanter, and Pribram was used in the 1960s in the context of theories that likened the mind to a computer. In 1968, Atkinson and Shiffrin used the term to describe their “short-term store”. The term short-term store was the name previously used for working memory. Other suggested names were short-term memory, primary memory, immediate memory, operant memory, and provisional memory. Short-term memory is the ability to remember information over a brief period (in the order of seconds). Most theorists today use the concept of working memory to replace or include the older concept of short-term memory, marking a stronger emphasis on the notion of manipulating information rather than mere maintenance.

Short-term memory was first discovered through research experiments in the 1960s, and working memory was coined by Alan D. Baddeley. His experiments in the 1970s and 1980s concluded that there was indeed a distinct form of memory that was shorter than long-term memory, but it was also quite distinct from short-term memory, in that working memory typically lasted only fractions of a second.

Factor affecting working memory capacity

Working memory capacity tends to declines with age, Especially after the age of 50. Physical activity factors can affect working memory capacity stress and anxiety significantly impair working memory capacity . when employees Experience high level of stress, their working memory is reduced, making it challenging to perform a task. Poor sleep quality reduced working Excessive workload and pressure reduced working memory capacity. Noise and distraction significantly impair working memory capacity. Comfortable, organized environments support working memory capacity. (Anggraini .F.T 2023)

Theoretical background

In 1974 Baddeley and Hitch introduced the multicomponent model of working memory. The theory proposed a model containing three components:

Central executive

The “central executive” was envisioned as a control system of limited attentional capacity responsible for coordinating and controlling two subsidiary slave systems, a phonological loop and a visuospatial sketchpad.

Phonological loop

Phonological loop was responsible for the storage and maintenance of information in a verbal form Visuospatial sketchpad.

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The visuospatial sketchpad was dedicated to the storage and maintenance of visuospatial information.

Episodic buffer

In the past decade, a fourth component, the “episodic buffer,” has been added to the model to capture a number of phenomena related to interactions between short-term and long-term memory that could not be readily explained within the original framework. In the next section, the phonological loop is described in more detail because it is the central component underlying working memory for verbal material. (Baddeley 1974)

Strategies to improve working memory capacity

Working memory training: Studies show that working memory training (cognitive training,) can improve working memory capacity, problem-solving, and reasoning.

Exercise: Regular physical activity can improve working memory by stimulating new brain cell growth and improving connections between them.

- **Mindfulness:** Mindfulness meditation can strengthen the brain and memory, and may even slow the progression of Alzheimer’s disease and dementia.
- **Mnemonic devices:** Mnemonics are a memorization technique that can help learn, retain, and recall information.
- **Creative problem solving:** Creativity can improve memory, processing speed, and cognitive flexibility.
- **Sleep:** Getting enough quality sleep can help us remember information. Reduce stress: Decreasing stress can help improve memory.
- **Practice retrieval:** Practicing retrieval can help improve memory.

Meaning of executive skills

“Executive functions refer to a set of high-level cognitive processes that enable us to plan, organize, and self-regulate our behaviour over time and in pursuit of goals.” (Barkley, R. A. 2012). Karl Pribram coined the term “executive functions” in the 1970s. Pribram’s research focused on the role of the prefrontal cortex in the brain.

Executive functions (EF) are a collection of cognitive processes that allow people to set goals, manage emotions, and work towards achieving those goals. These processes include:

- **Organization:** Knowing where I put things. The ability to create and maintain systems to keep track of information or materials.
- **Time Management:** Know about how long a task will take and what the deadline is the capacity to estimate how much time one has, how to allocate it, and how to stay within time limits and deadlines. It also involves a sense that time is important.
- **Planning/ Prioritization:** Deciding what steps to take. The ability to create a road map to reach a goal or to complete a task. It also involves being able to make decisions about what is important to focus on and what is not important.
- **Response Inhibition:** Seeing the consequence before I say or do something. The capacity to think before we act – this ability to resist the urge to say or do something allows us the time to evaluate a situation and how our behaviour might impact it.
- **Flexibility:** Going with the flow, accepting change. The ability to revise plans in the face of obstacles, setbacks, new information, or mistakes. It relates to an adaptability to changing conditions.
- **Emotional Control:** Keeping my cool when frustrated. The ability to manage emotions in order to achieve goals, complete tasks, or control and direct behaviour.

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- **Metacognition:** Evaluating how you're doing. The ability to stand back and take a bird's eye view of yourself in a situation, to observe how you problem solve. It also includes self-monitoring and self-evaluative skills
- **Task Initiation:** Getting started without a delay. The ability to begin projects without undue procrastination, in an efficient or timely fashion.
- **Sustained Attention:** Paying attention, even when I don't feel like it. The capacity to maintain attention to a situation or task in spite of distractibility, fatigue, or boredom.
- **Goal-Directed Persistence:** Sticking with your goal. The capacity to have a goal, follow through to the completion of that goal, and not be put off or distracted by competing interests.
- **Stress Tolerance:** Managing our stress. The ability to work in stressful situations and to cope with uncertainty, change, and performance demands.
- **Working Memory:** Remembering what I did and what I need to do. The ability to hold information in memory while performing complex tasks. It incorporates the ability to draw on past learning or experience to apply to the situation at hand or to project into the future.

Strategies to improve executive skills among employees

- **Understand individual needs:** Recognize that employees have different strengths and challenges, and take the time to understand their learning styles.
- **Set clear expectations:** Provide concise instructions and expectations, and break down large tasks into smaller parts.
- **Help with time management:** Encourage employees to use tools like calendars, planners, or task management apps, and set realistic deadlines.
- **Encourage breaks:** Help employees remember to take breaks to avoid burnout.
- **Be kind and encouraging:** Challenges with executive functioning can lead to anxiety and self-esteem issues.
- **Create a routine:** Having a routine can help decrease daily office work and increase productivity. Consider an escape room activity: Escape rooms can help executives improve their leadership skills, emotional and social competences, and alternative thinking.
- **Offer rewards:** Rewards can motivate employees by enhancing their productivity and work enthusiasm.

Need of the Study

In today's complex work environments, employees face ever-increasing demands that require both mental flexibility and robust cognitive processing abilities. Working memory capacity, the ability to hold and manipulate information over short periods, plays a critical role in how employees perform on tasks that require complex decision-making, multitasking, and problem-solving. Executive skills such as planning, goal-setting, inhibition control, and cognitive flexibility are essential for regulating attention and behaviour, adapting to new challenges, and effectively managing workplace demands. The link between working memory and executive skills provides a foundation for understanding how employees can optimize their performance, handle stress, and maintain high productivity levels.

Understanding the role of working memory and executive skills in employee performance is essential for identifying strategies to improve workforce efficiency and well-being. Research indicates that individuals with higher working memory capacity tend to perform better in

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complex tasks, as they can retain more information and focus despite distractions. These cognitive abilities are crucial in high-stress or multitasking situations, where the ability to stay organized, prioritize, and make quick decisions can significantly impact outcomes.

REVIEW OF LITERATURE

A literature review done to clarify this previous research of journal, articles, scholarly books and source of research. The review may also include a discussion of methodological issues and suggestions for future research. Conducting a literature review should enable a researcher to find out what research has already been done and identify what is unknown within the researchers topic. So, the studies of already literature place a vital role in the field of research in psychology. Literature review as a critical description and appraisal of a topic (Jesson,2011).

Anthony, carreiras M, Dunabeitia JA (2019) Investigated the impact of bilingualism on executive function and working memory in young adults. They study aimed at exploring the potential effects of bilingualism on two main processes: EF And WM. There are 180 young adults from Spain took part on these series task. They used tools such as corsi inverse tasks, digit span task (DST). The results of the bootstrapping analysis indicate that when the bilingual advantage in EF is found, it very often co-occurs with significant differences in socio demographic factors and memory abilities, suggesting that previous findings might have been a consequence of unmatched factors. They found no differences between groups in either of the forward versions of the tasks, but bilinguals systematically outperformed monolinguals in the backward conditions.

McCabe. D.P., Roediger H L., Mark A. McDaniel, Balota. D.A., Hambrick D. Z., (2010) Investigated the Relationship Between Working Memory Capacity and Executive Functioning Evidence for a Common Executive Attention Construct. The survey conducts 200 subjects between the age of 18-19 years old. They used tools such as Wisconsin card sorting test (WCST), Span task. The finding indicates that correlation Between working memory capacity and executive functioning constructs was very strong. But correlations between these constructs and processing speed were considerably weaker Controlling for working memory capacity or executive function eliminated age effects on episodic memory, and working memory capacity or executive function accounted for variance in episodic memory beyond that accounted for by processing speed.

Baniasadi. T, (2024) conducted a comparison study of Executive Function and Working Memory among Children with High and Low Levels of Physical Activity. The sample size of the study involving 269 children (128 girls) aged 9 to 12 years from regular schools in Tehran. They used tools such as Executive functions were assessed using the Behaviour Rating Inventory of Executive Function (BRIEF), working memory using the Wechsler Intelligence Scale for Children – Fifth Edition (WISC-V), and physical activity levels using the Physical Activity Questionnaire for Children (PAQ-C). Data were analyzed using SPSS version 27, with descriptive statistics calculated and independent samples t-tests conducted to compare cognitive functions between high and low physical activity groups. These findings emphasize the importance of promoting physical activity in schools and communities to enhance cognitive development.

Zhao. C, Chenglei Zhao, Zhao. M, Wang. L, Guo.J, Zhang. L, (2022) Investigated the effect of Exergame training on working memory and executive function in older adults There are 55 participants were randomly assigned to an exergame training (ET) group, an

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aerobic dancing training (ADT) group, or a control (CON) group. They used tools such as working memory measured by the N-back test, and Executive function measured by the Stroop test. The ET group showed a significantly positive effect in working memory, relative to the ADT (accuracy in 1-back test: $ES = 0.76$, $p < 0.01$), and CON group (accuracy in 1-back test: $ES = 0.87$, $p = 0.02$). The performance in the Stroop test showed some improvements in executive function after intervention in the ET and ADT groups (Stroop intervention effect: $ES = 0.38$; $p = 0.25$). They found that exergame had a positive effect on cognitive function in older adults without cognitive impairment. Long-term exergame training can improve working memory in older adults.

Ilya, A., Koç, B., & Alpay, K.C. (2022). Investigated the relationship between ELT students' verbal Working memory capacity, reasoning ability, and foreign language proficiency of productive skills. Aimed that investigate any possible relationships between English Language Teaching (ELT) students' verbal working memory capacity, grammatical reasoning ability, and their proficiency in productive skills in English. The sample collected from 40 students. They used tools such as Digit Span Test to measure their verbal working memory capacity and the Grammatical Reasoning Test to measure their reasoning ability. They were also tested on their speaking and writing skills in English through TOEFL-IBT test items. The scores on language tests were compared with the scores on the Digit Span and the Grammatical Reasoning Tests by running multiple regression analysis and a full-factorial ANOVA. The Results revealed that while the writing ability had a relationship with the verbal working memory and reasoning ability, the speaking ability could not be predicted by them.

Kotyusov, A.I.; Kasanov, D.; Kosachenko, A.I.; Gashkova, A.S.; Pavlov, Y.G.; Malykh, S. (2023) investigated the relationship between working memory capacity and various components of attention. The sample consisted of 136 healthy adult participants aged 18 to 37 years. They used tools to assess working memory (operation span, change detection, simple digit span, and adaptive digit span tasks), selective attention (visual search task), and attention control (Stroop and antisaccade tasks) tested several models with working memory and attention, either as a unitary factor or being divided into selective attention and attention control factors. Results showed that working memory and attention are distinct but correlated constructs. Working memory capacity was only related to attention control, whereas attention control was related to both constructs.

METHODOLOGY

Methods

Objectives, hypotheses, research design, sampling method, sample size, instruments Used statistical analysis in the present research study were discussed here:

Objectives

The objectives of the present study were:

- To assess the level of working memory capacity on employees.
- To analyze the level of executive skills on employees.
- To identify the effect of working memory capacity on employees executive skills.

Hypothesis

The following hypothesis were formulated based on the objectives of the study:

- Working memory capacity are significant prediction for exe skills among Employees

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Research Design

This study employed a simple random sampling technique, yielding a sample size of 75 samples from “Schumacher” employees. The demographic factors Such as age, gender, education, marital status and experience are considered.

Instruments used

- **Digit span test** - test was developed by Wechsler (1997) forward and backward digit span test forward (Average 8 - 12), (Above average 13+), (Below average 5-7). Digit span test Backward (Average 6-10), (Above average 11+), (Below average 3-5). Say the digits at a rate of 1 digit about every 1 sec, each span is scored '1' (Pass) or '0' (Fail). Only discontinue test when participant has failed both trials of the same span length. Use a monotonic voice; without inflections at the end. Do not repeat a span once read. This scale indicates the high internal consistency 0.85 and they had construct validity 0.80.
- **Executive skills questionnaire**- scale was developed by (peg Dawson and Richard Guare 2010) This scale is a 7-point rating scale (Strongly disagree -1, Disagree -2, Tend to disagree -3, Neutral-4, Tend to agree -5, Agree -6, Strongly agree -7). This scale consists of 36 items. This scale measures executive skills in twelve dimensions (1 - 3 Response Inhibition, 4 - 6 Working Memory, 7 - 9 Emotional Control ,10 - 12 Task Initiation ,13 - 15 Sustained Attention, 16 – 18 Planning/Prioritization,19 - 21 Organization, 22 - 24 Time Management, 25 - 27 Flexibility, 28 - 30 Metacognition ,31 - 33 Goal-Directed Persistence, 34-36 Stress tolerance. The scale indicates Inter consistency 0.92 and they had construct validity 0.85.

Procedure for adopting data collections

The data was collected from organizational employees from Schumacher India ltd. At Mettupalayam, Puducherry. All the participants who meet to provide with information about the procedure and the need for the study was explained in the language they understand the best. Consent was taken after a brief explanation about the study of the participants. It was assured that all the information collected from the participants would be kept confidential and used solely for research purposes. The demographic details and responses were collected from the participants.

Statistical tool used

The data was collected and analysed by using Statistical Package of Social Science (SPSS) version 23.0. The results are inferred through statistical techniques like Descriptive and Inferential statistical methods were used for data collections

Table 1 showing the correlation between working memory capacity and executive skills.

Variable	Working memory capacity	
	Forward	Backward
Response Inhibition	.024	.105
Working Memory	.012	.148
Emotional Control	-.082	-.042
Task Initiation	-.162	.186
Sustained Attention	.116	.262*
Planning/Prioritization	.243*	.337**
Organization	.278*	.007
Time Management	.102	.487**

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Variable	Working memory capacity	
	Forward	Backward
Flexibility	-.042	.024
Metacognition	.138	-.006
Goal-Directed Persistence	-.124	.106
Stress tolerance	.276*	.318**
Executive skills	.026	.292*

H1: There will be a correlation between working memory capacity and executive skills.

The above table shows the correlation between Response Inhibition, Working Memory, Emotional Control, Task Initiation, Sustained Attention, Planning/Prioritization, Organization, Time Management, Flexibility, Metacognition, Goal-Directed Persistence, Stress tolerance and working memory capacity (forward and backward) among Schumacher employees. Under Response Inhibition skill the obtained result shows that the forward value (.024) Backward value (.105) is positively correlated at the level of 0.05. Under Working Memory skill, the obtained result shows that the forward value (.012) Backward value (.148) is positively correlated. Under Emotional Control skill the obtained result shows that the forward value (-.082) Backward value (-.042) is negative correlated. Under Task Initiation skill the obtained result shows that the forward value (-.162) negative correlated, Backward value (.186) is positive correlated. Under Sustained Attention skill the obtained result shows that the forward value(.116) Backward value (.262) is positively correlated .Under Planning/Prioritization skill the obtained result shows that the forward value (.243) Backward value(.337)is positively correlated .Under Organization skill the obtained result shows that the forward value(.278)Backward value (.007) is positively correlated .Under Time Management skill the obtained result shows that the forward value(.102) Backward value (.487) is positively correlated . Under Flexibility skill the obtained result shows that the forward value (-.042) negative correlated Backward value (.024) is positively correlated Under Metacognition skill the obtained result shows that the forward value (.138) positive correlated, Backward value (-.006) negative correlated .Under Goal-Directed Persistence skill the obtained result shows that the forward value(-.124)is negative correlated, Backward value (.106) is positively correlated .Under Stress tolerance skill the obtained result shows that the forward value(. 276) and Backward value (.318) is positively correlated.

CONCLUSION

The main aim of this research is to explore the relationship between the Working memory capacity and executive skills. The study included a total 75 employees and employed a quantitative research design. The findings reveal that there is significant relationship between working memory capacity and executive skills. As a result, the study successfully addressed all objectives set by the researcher, including working memory capacity and executive skills.

REFERENCES

Anton E, Carreiras M, Duñabeitia JA (2019) The impact of bilingualism on executive Functions and working memory in young adults. PLoS ONE 14(2): e0206770. <https://doi.org/10.1371/journal.pone.0206770>.

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- Baddeley A (October 2003). "Working memory: looking back and looking forward". *Nature Reviews. Neuroscience*. 4(10): 829–839. Doi:10.1038/nrn1201. PMID14523382. S2CID3337171
- Baddeley AD, Hitch G (1974). Bower GH (ed.). *Working Memory*. *Psychology of Learning and Motivation*. Vol. 2. Academic Press. Pp. 47–89. Doi:10.1016/S0079-7421(08)60452-1. ISBN 978-0-12-543308-2. OCLC 777285348.
- Baddeley, A., Sala, S. D., & Robbins, T. W. (1996). Working memory and executive control. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 351(1346), 1378–1388.
- Banich, M. T. (2009). Executive function: The search for an integrated account. *Current Directions in Psychological Science*, 18, 89–94.
- Barkley, R. A. (2011a). *Executive functioning and self-regulation: Integration, extended phenotype, and clinical implications*. New York: Guilford Press.
- Barkley, R. A. (2011b). *Barkley Deficits in Executive Functioning Scale (BDEFS) manual*. New York: Guilford.
- Cowan N (1995). *Attention and memory: an integrated framework*. Oxford [Oxfordshire]: Oxford University Press. ISBN 978-0-19-506760-6. OCLC 30475237.
- Ericsson KA, Kintsch W (April 1995). "Long-term working memory". *Psychological Review*. 102 (2): 211–245. Doi:10.1037/0033-295X.102.2.211. PMID 7740089.
- Evidence for a Common Executive Attention Construct. *Neuropsychology* DOI:10.1037/a0017619.
- John Wiley & Sons, 1807–2007 DOI 10.1002/andp.200610235 <https://myweb.rz.uni-augsburg.de/~eckern/adp/contents/contents-2007/editorial07.pdf>.
- Kerlinger, (1973) *Scientific research*. <https://www.sfu.ca/~palys/Kerlinger-1973-ConstructsVariablesDefinitions.pdf>.
- McCabe. D. P., Roediger H L., Mark A. McDaniel, Balota. D.A., Hambrick D.Z., (2010) Investigated the Relationship Between Working Memory Capacity and Executive Functioning.
- Schweppe J (2014). "Attention, working memory, and long-term memory in multimedia learning: A integrated perspective based on process models of working memory". *Educational Psychology Review*. 26 (2): 289. Doi:10.1007/s10648-013-9242-2. S2CID 145088718.
- Shivani Sharma and Nandita Babu 2017, Interplay between Creativity, Executive Function and Working Memory in Middle-Aged and Older Adults. Gurgaon, Haryana 122002, India. DOI: 10.1080/10400419.2017.1263512.
- Unsworth & Engle, (2007). *Working Memory Capacity* ScienceDirect.com <https://www.sciencedirect.com > ...Working Memory Capacity – an overview>.

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Conflict of Interest

The author(s) declared no conflict of interest.

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