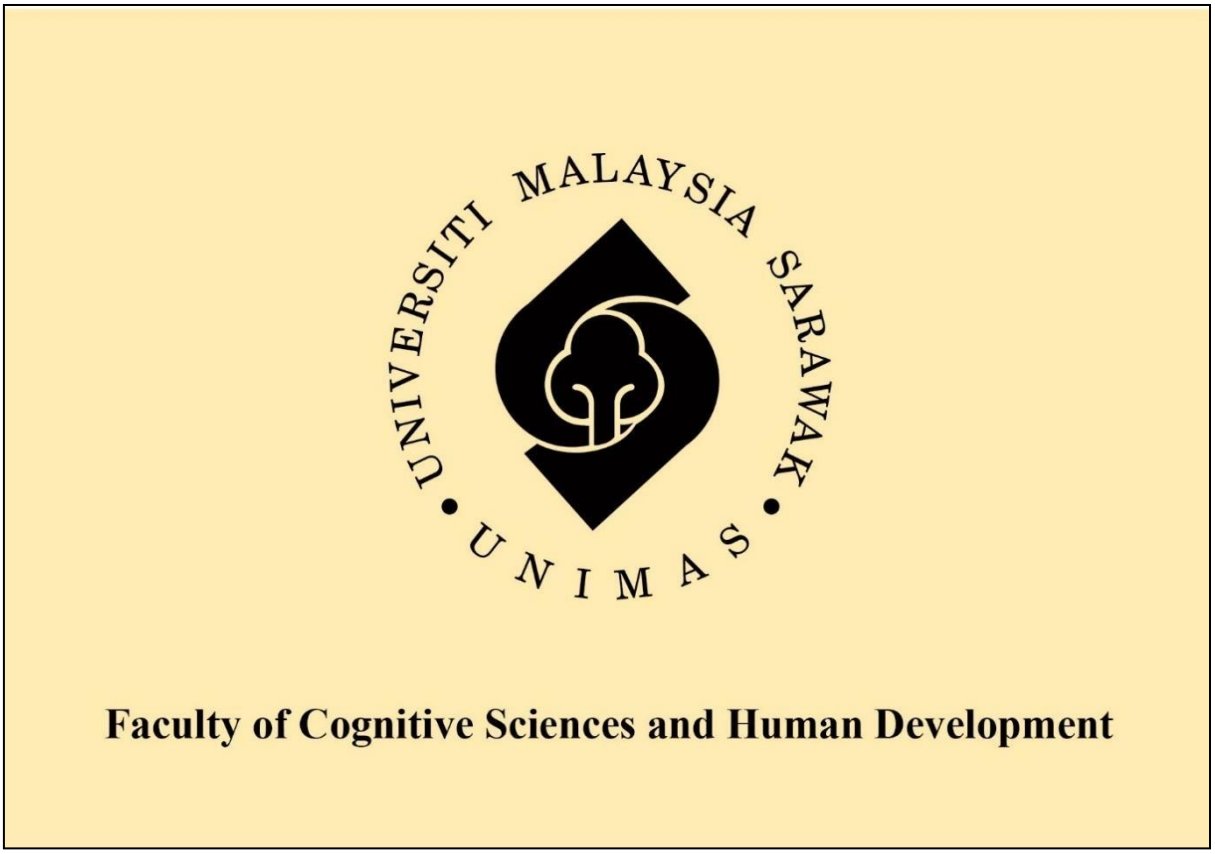

AGE DIFFERENCES AND WORKING MEMORY PERFORMANCE

Anis Binti Maliki

Bachelor of Psychology (Honours)

2022

UNIVERSITI MALAYSIA SAWARAK

Grade: _____

Please tick (√)

Final Year Project Report [/]

Masters [ ]

PhD [ ]

DECLARATION OF ORIGINAL WORK

This declaration is made on the 4th day of July 2021.

Student's Declaration:

I Anis Binti Maliki 69097**,** Faculty of Cognitive Sciences and Human Development hereby declare that the work entitled, "**Age Difference and Working Memory Performance"** is my original work. I have not copied from any other students' work or from any other sources except where due reference or acknowledgement is made explicitly in the text, nor has any part been written for me by another person.

20 July 2022
Date submitted

ANIS BINTI MALIKI (69097)
Name of the student (Matric No.)

Supervisor's Declaration:

I MOHAMMAD AZHARI BIN ABU BAKAR hereby certifies that the work entitled, **AGE DIFFERENCES AND WORKING MEMORY PERFORMANCE** was prepared by the above named student, and was submitted to the "FACULTY" as a * partial/full fulfillment for the conferment of **BACHELOR OF PSYCHOLOGY(HONOURS),** and the aforementioned work, to the best of my knowledge, is the said student's work

Received for examination by:
(MOHAMMAD AZHARI BIN ABU BAKAR)

Date: 22/7/22

I declare this Project/Thesis is classified as (Please tick (√)):

☐ **CONFIDENTIAL** (Contains confidential information under the Official Secret Act 1972)*
☐ **RESTRICTED** (Contains restricted information as specified by the organisation where research was done)*
☑ **OPEN ACCESS**

Validation of Project/Thesis

I therefore duly affirmed with free consent and willingness declared that this said Project/Thesis shall be placed officially in the PeTARY with the abide interest and rights as follows:

- This Project/Thesis is the sole legal property of Universiti Malaysia Sarawak (UNIMAS).
- The PeTARY has the lawful right to make copies for the purpose of academic and research only and not for other purpose.
- The PeTARY has the lawful right to digitise the content to for the Local Content Database.
- The PeTARY has the lawful right to make copies of the Project/Thesis for academic exchange between Higher Learning Institute.
- No dispute or any claim shall arise from the student itself neither third party on this Project/Thesis once it becomes sole property of UNIMAS.
- This Project/Thesis or any material, data and information related to it shall not be distributed, published or disclosed to any party by the student except with UNIMAS permission.

Student's signature **ANIS** (20 JULY 2022)

Supervisor's signature: _____ (22 JULY 2022)

Current Address:
NO. 19 LORONG IS 4 TAMAN INDERA SEMPURNA, 25150 KUANTAN, PAHANG.

Notes: * If the Project/Thesis is **CONFIDENTIAL** or **RESTRICTED**, please attach together as annexure a letter from the organisation with the period and reasons of confidentiality and restriction.

[The instrument was duly prepared by the PeTARY]

AGE DIFFERENCES AND WORKING MEMORY PERFROMANCE

ANIS BINTI MALIKI

This project is submitted
in partial fulfilment of the requirements for a
Bachelor of Psychology with Honours

Faculty of Cognitive Sciences and Human Development
UNIVERSITI MALAYSIA SARAWAK
(2022)

The project entitled **'[**Age Differences and Working Memory Performance**]'** was prepared by [Anis binti Maliki (69097)] and submitted to the Faculty of Cognitive Sciences and Human Development in partial fulfillment of the requirements for a Bachelor of Psychology with Honours

Received for examination by:

MOHAMMAD AZHARI BIN ABU BAKAR

(Name of Supervisor)

Date:

22/7/22

Gred

A

ACKNOWLEDGEMENT

First and foremost, I'd choose to express my deepest appreciation to my supervisor, Mr. Mohamad Azhari bin Abu Bakar, for his ongoing advice and consultation. I appreciate the time, effort, knowledge, and advice you provided throughout the preparation of my final year project, especially during this epidemic period, when you did your best to hold virtual consultation sessions. Thank you for your support and encouragement along this journey. I would be unable to accomplish this project without your assistance and instruction.

Next, I'd also want to voice my heartfelt gratitude to my family, especially my parents and my siblings. Thank you so much for your efforts to provide me with physical and psychological support throughout this research. I would not be the person I am now if you had not believed in me.

Furthermore, I'd want to offer my profound thanks to all of my research volunteers. Thank you for agreeing to take part in my research project and making the time to do so. I will remember your assistance and hope that this research was beneficial to you as well.

Aside from that, I'd like to offer my sincere gratitude to my course mates and group assignment participants. Thank you for making every attempt to make everything perfect so that I may devote more time to my final year project. I am honoured to have you as colleagues and classmates.

Finally, I'd want to thank all of my best friends especially Fatin Najihah, Aimi Nadhirah, and Azmina for their unwavering support and encouragement throughout the process. Thank you for lending me your ears and time to listen to me whenever I needed it. I hope we can all graduate on time and get together shortly.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study aimed of this research was to investigate into age differences in working memory performance, specifically verbal working memory performance based on total correct items recalled and total time taken. This study included thirty (30) participants, including Malaysian students and undergraduate students at the University Malaysia Sarawak (UNIMAS). A quasi-experimental design was used in this work to conduct quantitative research. The Pearson correlation, Mann Whitney u-test and Independent t-test were then employed to test the study's hypotheses. The findings revealed that a significant age difference was detected in terms of verbal working memory performance based on the total correct items recalled, with young adults outperforming adolescents in the task. In terms of the time it took for participants to answer, the results demonstrated that there was no significant difference between age and age groups on verbal working memory performance based on total time taken, as previous research had revealed. This study also discussed the implications of the findings for future researchers to consider.

Keywords: age differences, working memory performance, verbal working memory

ABSTRAK

Kajian ini bertujuan untuk menyelidik perbezaan umur dalam prestasi ingatan kerja, khususnya prestasi ingatan kerja lisan berdasarkan jumlah perkataan yang betul diingat dan jumlah masa yang diambil. Kajian ini melibatkan tiga puluh (30) peserta, termasuk pelajar Malaysia dan pelajar sarjana muda di Universiti Malaysia Sarawak (UNIMAS). Reka bentuk kuasi eksperimen digunakan dalam kerja ini untuk menjalankan penyelidikan kuantitatif. Korelasi Pearson, ujian-t bebas dan ujian Mann Whithey U kemudiannya digunakan untuk menguji hipotesis kajian. Penemuan mendedahkan bahawa perbezaan umur yang ketara telah dikesan dari segi prestasi ingatan kerja lisan berdasarkan jumlah item yang betul yang dipanggil semula, dengan golongan dewasa muda mengatasi prestasi remaja dalam tugas itu. Dari segi masa yang diambil untuk peserta menjawab, keputusan menunjukkan bahawa tidak terdapat perbezaan yang signifikan antara umur dan kumpulan umur pada prestasi ingatan kerja lisan berdasarkan jumlah masa yang diambil, seperti yang telah didedahkan oleh kajian terdahulu. Kajian ini juga membincangkan implikasi dapatan kajian untuk dipertimbangkan oleh penyelidik akan datang.

Kata kunci: perbezaan umur, prestasi ingatan kerja, ingatan kerja lisan

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background of the study, the statement of problem, the purpose of the study, the objective in this study, the research question, the research hypothesis and the theoretical framework in this study.

1.1 Background of Study

A study by Chopik, Bremenr, Johnson & Giasson (2018) stated that, they have operationalize aging perceptions as evaluations individuals tie to different ages by reporting (a) the age they would like to ideally be, (b) the age they feel like, (c) the age they hope to live until, and (d) how old other people think they are. Aging is defined as the progressive physiological changes in an organism that lead to senescence or a decline in biological functions and the organism's ability to adapt to metabolic stress (Rogers, 2020). During this period, people face the change in their lifestyles, not only physical changes but also the cognitive changes. Many previous studies that has been done by a several scientists such as Craik (1994), Craik (1990), and Mitchell et al. (2000), that have provided an explanation that related to change in the individual's physical and cognitive change with age advanced. A study by Murman (2015), has examined the cognitive changes that occur with normal ageing, as well as the structural and functional correlates of these cognitive changes, as well as the prevalence and cognitive impacts of age-related disorders, such as reductions in performance during age-related to complicated attentional tasks. It thus signifies that as people get older, they tend to have more trouble accomplishing tasks that require selective or split attention. Another study by Craik

(1994) stated that people with advanced ages can perform as well as their younger counterparts when the task requires relatively passive reproduction of small amounts of information. However, when the task requires more active restructuring of the material, or the need to both hold some material and perceive additional inputs, the older person suffers. Another review by Craik (1990), agreed that the older adults perform well when the work includes following routine, automated, and well-practiced steps, but they struggle more when the task needs unique material manipulation or new inferences and abstractions from the information provided.

According to Cowan (2014) working memory is one of the most commonly used terms in psychology. It has frequently been linked or associated to intelligence, information processing, executive function, understanding, problem-solving, and learning in individuals varying in age from infancy to old age, as well as in all types of animals (Cowan, 2014). Working memory capacity is refer toward the individual differences' capabilities and storages in the dimension toward the limitation in an individual's working memory (Wilhelm, Hildebrandt & Oberauer, 2013). The new information that has been received is then held for a moment in working memory until it recalls back and store in short-term and long-term memory (Spencer, 2020). For instance, a child was asked, what he has learned in his school just now. In this situation, it required the working memory to recall back what the information that child has learned at school. Therefore, working memory is the important component in leading the children cognitive development in increase the working memory capacity as the improvement in cognitive change in child development.

People have to get older year by year and commonly known no one can escape from this reality. World Health Organization (2021), also has stated that in the biological level, ageing is caused by the accumulation of a wide range of molecular and cellular

damage over time. This leads in a progressive reduction in physical and mental capacity, an increased risk of disease, and, eventually, death. These changes are neither linear nor consistent, and they are only tangentially related to a person's chronological age. Thus, we know that people with age older tend to be having some memory loss and losing some physical abilities. In providing more on the explained information of age related to cognitive changes. Therefore, this study aims to investigate the relationship and difference between age differences and groups toward working memory performance based on the total number of correct items recalled and total time is taken.

1.2 Problem Statement

Previous studies such as by Craik (1994), Mitchel et all (2000), and Chen Li et all (2001) has revealed that aging has a possible in declining the physical cognitive abilities in the individual. Some studies by Bopp & Verhaeghen (2007) and Salthouse (2000) has reviewed that working memory also has declining with the increasing age toward the individual. For instance, Chen Li (2001) has review some empirical data of cognitive aging at the behavioural information processing and neurobiological levels and they have considered to aim in finding of age-related to declining in neuromodulation and cognition.

Furthermore, Chen Li (2001) stated that age increase can be related with the declining in the information process in the individual cognition and some of the transmitter in the brain also affected by the cognitive aging, for example the cholinergic transmission that for the long-term memory consolidation is important in Alzheimer pathology. By his review, we can understand that people their age advance, are facing reality loss of some of the cells or neurotransmitters in the brain that necessary for the

long-term memory consolidation and it can affect them in difficulties storing the information. This conclusion leads us to believe that people, as they age, would experience some memory loss. But in reality, we can see that people, as they age, have continued with their studies, such as Master's, Ph.D., and even doctorate, and we can see that they have pursued it effectively.

Another study by Earles (1996), claimed that age differences in memory for performed items do not appear to be independent of those in memory for nonperformed items, as one might predict given the lack of differential age effects. Working memory has been expected to be declining in increasing age of individual. Working memory loss may indicate that older persons are less able to integrate information in memory than younger adults since they can't store and process information at the same time (Earles, 1996). Also, Earles (1996) has stated that working memory's impact on age differences in memory for accomplished tasks could also be explained by the need to integrate information from several modalities. However, from this previous study, it still remains unclear in how the working memory performance between the two-age group are different, and why are the people with their age advances are expected to perform less than the younger person.

A study by Salthouse (1994), decreased levels of effectiveness in the components of the Baddeley working memory model (1983) is associated with the increased age. Age differences also related in the important of working memory process because age related variance in the cognitive measures was greatly reduced (Salthouse, 1994). Because there was proof for the explanation age-related in a person's functioning memory execution, the discovery was made in a faraway country, and it was primarily intended to quantify the contrast in functioning memory execution between young adulthood and more seasoned adulthood, and it may not be reasonable to be summed up on the Asian populace.

Hence, this study has been conducted in the context of Malaysia, and it also has been conducted between adolescents in age 15 to 19 years old and young adults aged 20 to 24 years old among students and undergraduates in UNIMAS.

1.3 Research Objectives

1.3.1 General Objective

To investigate the relationship and difference between age and age groups towards working memory performance based on the total number of correct recalled and time taken.

1.3.2 Specific Objectives

- To investigate the relationship between age and working memory performance based on the total number of correct items recalled.
- To investigate the relationship between age and working memory performance based on the total time taken.
- To investigate the difference between age groups on working memory performance based on the number of correct items recalled.
- To investigate the difference between age groups on working memory performance based on total time taken.

1.4 Research Questions

1. Is there any significant relationship between age and working memory performance based on the total number of correct items recalled?

2. Is there any significant relationship between age and working memory performance based on total time taken?
3. Is there any significant difference between age groups on working memory performance based on the total number of correct items recalled?
4. Is there any significant difference between age groups on working memory performance based on the total time taken?

1.5 Research Hypotheses

1. There is significant relationship between age and working memory performance based on the total number of correct items recalled.
2. There is significant relationship between age and working memory performance based on the total time taken.
3. There is significant difference between age groups on working memory performance based on the total number of correct items recalled.
4. There is significant difference between age groups on working memory performance based on the total time taken.

1.6 Conceptual Framework

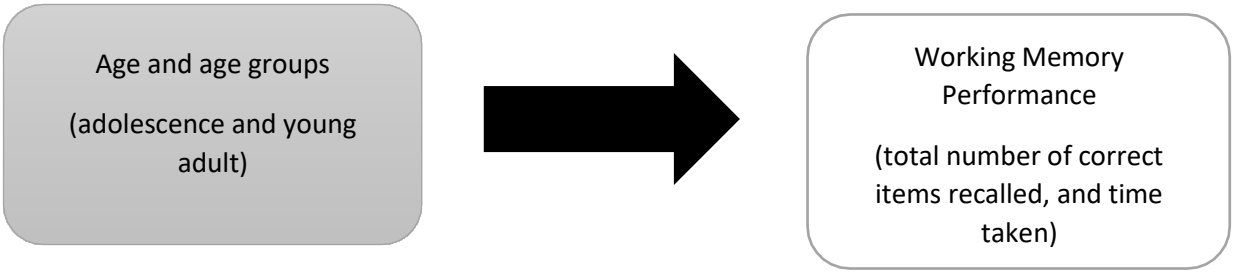

Figure 1.6: Conceptual framework of the study

This study has focused on how age can influence an individual's working memory performance. Therefore, the independent variable in this study is the age and age groups, and the dependent variable is the verbal working memory performance.

1.7 Significance of Study

Working memory has led the important role in person's cognition development, hold new information and as well as the role in reasoning abilities in the individual (Spencer, 2020). Each individual has their own working memory that can help them in the ability to restore and gain the new knowledge and at the same time provide the improvements on more cognitive ability. But at the same time, an individual has to face the period of aging. In the aging phenomenon, some individuals face the decline of some physical and cognitive abilities. According to Chen Li, Lindenberger & Sikstrom (2001), individual with age advances facing the decline in the representation and maintain the information in the mind. Furthermore, in the study by Cadar, Usher & Davelaar (2018) has found as a result of reduced encoding of relationships between words that co-occur in working memory, older adults show decreased significant effect of closer temporal proximity. From their result, it showed that the consistent finding that the formation of rich, elaborative memory traces is less common in older adults or people with their age advance (Craik, 1992). Therefore, this study has finished providing further information related to the age differences in verbal working memory performance.

1.8 Definition of Terms

1.8.1 Age

Conceptual Definition:

Age in individual life is important because it shows how long the person or the individual life. Age known as time life spent, is the number that show how many years that a person lives in their life. Counting from age day 1 in infancy and early childhood until several years period in old age. And it consists a particular stage in individual's life (Lexico, n.d.).

Operational Definition:

In this study, age is the category that influences and be examined between two groups, which is adolescence in age 15 to 19 years old and young adult in age 20 to 24 years old.

1.8.2 Working Memory Performance

Conceptual Definition:

Working memory is a known term as temporary storage that holds the new information that gains from the cognitive process such as reading, comprehension, and problem solving (Baddeley, 1983). Further, working memory is a limited capacity system that holds the new information from cognitive performance in a brief of period time.

Operational Definition:

Working memory is the measurement in this study by the complexity of the task, and the participants examined in the reading span task adapted from Gick, Craik, and Morris (1988) to determine how well the participants finish the task and how much stimuli the participants are able to memorize and recall at the end of the experiment. At the end of the experiment, the answer of participants' answer was recorded and the duration of time to participants' answer was also recorded for the next process.

1.9 Summary

This chapter provides readers with a succinct explanation of the material pertaining to this study. The study's background, problem statement, research aims, questions, hypotheses, conceptual framework, significance of the study, and term definitions are all described.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviewed the theories, findings, and discussions from the past related studies about age difference, cognition changes in aging, and working memory. In this study, scholarly sources have been used in order to review the past studies on the related topics of age differences and working memory performance. The purpose of this study is to determine whether age differences can be influenced directly the working memory performance. In order to do that, it is the requirement to review a few past related studies in this study.

2.1 Age

2.1.1 Theory Related to Age Differences

2.1.1.1 Piaget's Theory of Cognitive Development

Huitt & Hummel (2003), has stated that Piaget was interested in the intelligence, adaption and equilibration. Firstly, the cognitive intelligence is the way the living adapts toward their environment, next is the adaption is toward the individual's behaviour, on how the individual control their mental schema toward their environment structure and lastly is the equilibration, is how the individual balancing their behaviour toward their own mental state on their environment.

Piaget has developed four stage of cognitive development (Huitt & Hummel, 2003). The first stage is the Sensorimotor stage, this stage is during the infancy period after the baby was born until he/she age 2 years old. In this stage, a child has developed intelligence through their physical and motors development, also some knowledge of