Faculty of Cognitive Sciences and Human Development

THE RELATIONSHIP BETWEEN ANXIETY AND VERBAL

WORKING MEMORY PERFORMANCE

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Bachelor of Psychology (Honours)

2022

UNIVERSITI MALAYSIA SAWARAK

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Final Year Project Report ☑
Masters ☐
PhD ☐

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THE RELATIONSHIP BETWEEN ANXIETY AND VERBAL WORKING MEMORY PERFORMANCE

SHARIFAH KHAIRIEYAH BINTI SYED HOOD

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 'The Relationship Between Anxiety And Verbal Working Memory Performance' was prepared by *Sharifah Khairieyah Binti Syed Hood (72664)* 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:

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Date:

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ABSTRACT

This study aimed to identify the relationship between anxiety and verbal working memory performance based on the total number of correct items recalled and the total time taken. A quasi-experimental design was employed in this study. The study was conducted with 30 undergraduate participants from University Malaysia Sarawak (UNIMAS). Participants were administered the State-Trait Anxiety Inventory, adopted from Spielberger (1983), to measure their state and trait anxiety. The participant answered the Reading Span task adapted from Daneman and Carpenter (1980). The correlation between anxiety and verbal working memory performance was then analysed using Spearman Correlation. The findings reveal that there was no significant relationship between anxiety and verbal working memory performance for the total number of correct items recalled and the total time taken, which is contrary to the prominent finding that supports anxiety has a negative relationship with verbal working memory performance.

Keywords: anxiety, verbal working memory performance, working memory

ABSTRAK

Kajian ini bertujuan untuk mengkaji hubungan antara keresahan dan prestasi ingatan kerja lisan berdasarkan jumlah item yang diingati dengan tepat dan jumlah masa yang diambil. Kaedah reka bentuk eksperimen kuasi diaplikasikan di dalam kajian ini. Kajian ini disertai oleh 30 peserta daripada Universiti Malaysia Sarawak (UNIMAS). Peserta dikehendaki menjawab soal selidik *State-Trait Anxiety Inventory* yang diambil daripada Spielberger (1983) untuk mengukur *State Anxiety* dan *Trait Anxiety* peserta. Peserta juga perlu menjawab *Reading Span task* yang diadaptasi daripada Daneman and Carpenter (1980). Hubungan antara keresahan dan prestasi ingatan kerja lisan diuji menggunakan ujian korelasi Spearman. Dapatan kajian menunjukkan bahawa tiada hubungan yang signifikan antara keresahan dan prestasi ingatan kerja lisan untuk jumlah item yang diingati dengan tepat dan jumlah masa yang diambil. Dapatan ini adalah bertentangan dengan dapatan kebanyakan kajian yang serupa yang menyokong adanya hubungan negatif diantara keresahan dan prestasi ingatan kerja lisan.

Kata kunci: keresahan, prestasi ingatan kerja lisan, ingatan kerja

CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter describes the background of the study, the problem statement, the research objectives, research question, and the hypothesis of the study. Besides that, it will also feature the research framework, definition of terms, significance of study, scope of study and will be sum with a brief summary of the chapter.

1.2 Research Background

Anxiety and fear are both controlled by the same part of the brain. Study by Breiter et al. (1996), observed that participants show an increase in the amygdala signal when being present with fearful expression suggested due to the changes in their anxiety, attention, or fatigue. Anxiety also activates our body sympathetic nervous system and the fight and flight response (Kunimatsu and Marsee, 2012). This is because anxiety escalates when facing their fear or confronting an unexpected situation or problem. Meanwhile, for students, the common example causes anxiety are test anxiety and performance anxiety where people feel extremely anxious in situation where they are being tested due to the fear not being able to reach their expectations in situation such as sitting an exam (Doherty and Wenderoth, 2017; APA, n.d.). Any factors or reason may cause people feeling anxious and that feeling differs every time. Some people may also experience anxiety higher as it is merged with their personality. It is also being categorized as trait anxiety as their past experiences has formed their personality prone to anxiety (Spielberger, 2013).

The feeling of anxiety has been shown its positive and negative effect to people. According to Jones, Nelson and Opitz (2021), a prolonged anxiety or an acute stress may cause

people prone to cancer, psychosis, neurodegenerative disease which include Parkinson's disease and dementia. However, Jones, Nelson and Opitz (2021) added that the feeling of anxiety also imposes a positive impact as the participants in the study obtain better task performance after getting negative feedback that evoke anxiety to the participants. The positive correlation between anxiety and performance shows that even though anxiety is a negative emotion, it could result in a positive behaviour for people. This is being said as occasional feeling of an anxious and stress may help people deal with their problem efficiently, but constant feeling of anxious and fear will only hinder people from confronting their problem.

Working memory capacity (WMC) plays an important role for people confronting their problem. This is being said as one of the roles of working memory capacity is problem solving. According to Wiley and Jarosz (2012), WMC controls the cognitive processes that aids people in focusing their attention to the problem, resisting unrelated distraction, and narrowing down the search space for the solution. However, this cognitive process could be disrupted by anxiety as it will disrupt the focus to the problem and create a defence mechanism to avoid it. It is supported by study from Takács et al. (2015), that shows anxiety impact people decision-making process.

Much research has been done to find the correlation between working memory and anxiety. Besides that, research conducted by Ikeda, Iwanaga and Seiwa (1996), stated that the high anxiety group take a longer reaction time in the verbal working memory task than participants from low anxiety group. Study by Ikeda et al., (1996) gives an insight that the group with high anxiety required more time completing the working memory test in order to obtain the same accuracy as the low anxiety group. Ikeda et al., (1996) highlight that anxiety, worry and cognitive self-concern are verbal memory tasks that solely involve with process within the phonological loop and does not give an effect on the spatial memory task. Besides

that, the result from study by Markham and Darke (1991) also shows similar result as previous research with participants that are highly anxious spent more time integrating the information presented in the task. The research noted that participants with high anxiety level shows deficit in the performance in the verbal reasoning task.

Contrary result from studies on the correlation of anxiety and working memory especially on the verbal working memory for instance suggested that only the low-load verbal working memory process is prone to anxiety related disruption meanwhile, for spatial working memory process, all difficulty is prone to anxiety disruption (Vytal, Cornwell, Arkin, Letkiewicz and Grillon, 2013). Research by Crowe, Matthews and Walkenhorst (2007) found a positive correlation between trait anxiety and central executive working memory test, the dual task. Participants with high score of trait anxiety recorded a better score for digit recall and visual tracking task compared to participants that scored lower in trait anxiety. The trait anxiety of the participants is counted as a motivational and facilitatory causes on the performance in dual task. Even though the prominent result shows a negative correlation between anxiety and verbal working memory, some studies has shown evidence of contrary result that proves the opposite outcome. Since verbal working memory has shown various correlation to anxiety, it is only right to focus the study to the relationship between anxiety and verbal working memory.

Hence, this study aims to investigate the relationship between anxiety and verbal working memory performance. The performance of verbal working memory will be measure based on the total number of correct items recalled and the total time taken by the participants during the research.

1.3 Problem Statement

Previous studies have been done to find correlation between anxiety and working memory specifically on the working memory subsystem which is the phonological loop, visuospatial

sketchpad, central executive, and the episodic buffer. This is by considering tasks utilizing verbal information, visual or spatial information and problem solving. Various working memory task had been performed to find which working memory subsystem that would be significantly affected by anxiety. Prominent research had proven there is significant correlation between anxiety specifically with verbal working memory performance (Ikeda et al., 1996; Markham and Drake, 1991; Owens et al., 2008; Grosdemange et al., 2015) based on the verbal memory task conducted. According to Ikeda et al., (1996), the outcome of the research shows that high anxiety group spent a relatively longer time in verbal tasks but shows no effect on spatial task suggesting that anxiety or cognitive self-concern and worry are verbal cognitive tasks, which is why high anxiety group spent longer duration to process verbal information as anxiety intervene the processes in the phonological loop.

Besides that, previous research has shown inconsistent findings of the correlation of anxiety and the verbal working memory performance. Some research noted that anxiety gives a positive effect on the verbal working memory performance or shows no correlation at all in the tests conducted (Vytal et al., 2013; Crowe et al., 2007; Miller and Bichsel, 2004). Therefore, this research aims to find whether there is a significant relationship between the anxiety level of the participants with their verbal working memory score.

Furthermore, the past research findings were concentrated in the western culture. Thus, there is a need to conduct the research in Malaysian context to test the correlation and to find the reliability of the assessments and test in Malaysian culture. This is because, different culture may present different outcome from the study. It also could give an insight of the result obtained in term of culture differences in the relationship between anxiety and verbal working memory. Moreover, there is insufficient research conducted among universities students to find the relationship between anxiety and verbal working memory.

1.4 Research Objectives

The general research objectives of this study are to investigate the relationship between anxiety and verbal working memory performance. The specific research objectives are as follows:

1. To identify the relationship between anxiety and verbal working memory performance based on the total number of correct items recalled.

2. To identify the relationship between anxiety and verbal working memory performance based on the total time taken

1.5 Research Questions

From the research objectives, the following research questions are important to be discussed and answered in this study:

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

2. Is there any relationship between anxiety and verbal working memory performance based on the total time taken?

1.6 Research Hypotheses

$H0_1$: There is no significant relationship between anxiety and verbal working memory performance based on the total number of correct items recalled.

$H0_2$: There is no significant relationship between anxiety and verbal working memory performance based on total time taken.

1.7 Conceptual Framework

The relationship between anxiety and verbal working memory performance are as follow:
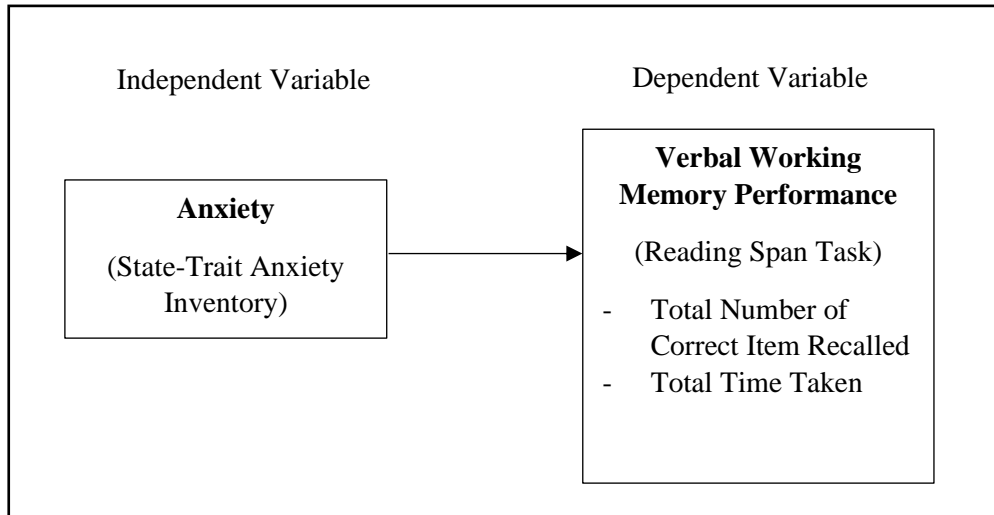
Figure 1.7: Conceptual Framework

1.8 Definition of Terms

1.8.1 Anxiety

Conceptual definition

According to APA (n.d.), anxiety is classified as emotion that makes a person feels tensed, having worrying thoughts, and experiencing physical changes such as increase in blood pressure. Based on the DSM 5, generalised anxiety disorder is characterised as an excessive feeling of anxious and worry that causes the people experienced it having a tough time control the worry and having at least 3 symptoms of anxiety for more days that not for the past 6 months.

Operational definition

In this study, anxiety is defined based on the anxiety level of the participants according to their score on Spielberger (1983) State-Trait Anxiety Inventory. Anxiety levels of the participants will be measure in term of their state anxiety and trait anxiety.

1.8.2 Verbal Working Memory

Conceptual definition

Verbal working memory is in charge of storing verbalizable information temporarily, for example, letters, words, numbers, and nameable items (Van Dun and Mariën, 2016). In another way, verbal working memory is in charge of language comprehension based on the verbally presented information.

Operational definition

In this study, verbal working memory performance is measured by the total number of correct items recalled and the total time taken by the participant using Reading Span Test (RST) that was developed by Daneman and Carpenter (1980). The score of the test will be collected and analysed to identify participants' verbal working memory performance.

1.9 Significance of Study

This study aimed to enlighten the effect of anxiety to humans and how it could impact people if this problem is underestimated. Besides that, this study also put an emphasis on the effects of anxiety among students.

Next, students could benefit from the outcome and finding of the study to improve their mental health along with their verbal working memory performance. Students could also gain insight on the importance of mental health and well-being to promotes better daily function.

Other than that, this research could also be beneficial for future research reference. This study could help by giving an additional support in terms of the data obtained to aid new research that is related to the study.

1.10 Scope of Study

The study will be focused on the undergraduate students at University Malaysia Sarawak to investigate the effect of anxiety on students' verbal working memory performance. The performance focused will be based on the total number of correct items recalled and the time taken only.

1.11 Conclusion

This chapter reviewed the introduction of the study conducted. It explains the important aspect of the proposed study. This study purpose is to investigate the effect of anxiety on verbal working memory performance based on the total number of correct items recalled and the time taken by the participants.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

Chapter 2 is a literature review of the study conducted. The literature review will include related issues of this study which are the nature of working memory and anxiety. It will also contain review of similar findings from past research studies that have been conducted. These past researches will aid this research in terms of reasoning of the relation of the problem. Lastly, it will end with a brief conclusion as a closure to the chapter.

2.2 Anxiety

2.2.1 Theory Related to Anxiety

2.2.1.1 Psychoanalytic Theory of Anxiety: Freud (1926)

The representation of *The Ego and Id* by Freud shift in the second theory of defence as ego is illustrate as the "actual seat of anxiety" (Shill, 2004). Freud devise anxiety as the cue of unpleasure and triggering the defence (Shill, 2004).

> "What it is that the ego fears from the external world and from the libidinal danger cannot be specified; we know that the fear is of being overwhelmed or annihilated, but it cannot be grasped analytically." (Freud, 1915, as cited in Shill, 2004) "The ego is simply obeying the warning of the pleasure principle." (Freud, 1961, as cited in Shill, 2004)

From the paragraph above, Freud implies that anxiety as something that are overwhelming, annihilated and innately unpleasurable that it is avoided for that specific reason. Anxiety, being opposite from Freud's pleasure principle, urge the ego to form a resistance. According to Shill (2004), anxiety is use as a signal that replicated the experienced similar state of a danger or

fear by the ego's capacity. The ego process will provide a signal when there is any presence of an incoming threat. This signal could only be present when the ego store in the memory the previous encounter of a danger or an envision of a dangerous situation to forecast when an actual threat occurs in future. In order to understand the threat, ego will undergo processes such as learning, storing memories, perception, awareness of physiological changes due to sympathetic arousal, and reasoning. The outcome of the ego functions is known as the signal anxiety. Shill (2004) further clarifies signal anxiety as an involuntary and fearful reaction towards danger. The threats that could evoke anxiety reaction in people consists of threats to individual's ego or self-esteem. To sum, when a threat is detected by the ego, it will trigger unconscious resistance and it will respond with signal anxiety. The ego will then build up a defence mechanism to avoid the unpleasure.

Freud (1926) proposed defence mechanism as "the protection of the ego against instinctual demands". Defence mechanisms are the solutions developed by the ego to deal with id and superego. Shill (2004) added that defence operates to remove the threat of unpleasure. Defence mechanisms introduced by Freud are repression, distortion, or discharge in the form of anxiety that occurs unconsciously. Anna Freud then added more defence mechanisms that allow to lessen anxiety and cope with life stressors such as denial, projection, displacement, intellectualization, rationalization, reaction formation, regression, and sublimation. The Ego uses the defence mechanism in order to reduce anxiety or tension arise because of conflicts in the unconscious mind (Shill, 2004). In another way, the defence mechanism acts as an alternative for people in evading consciousness of the unpleasure thoughts, emotions and urges that occurs due to past experiences or the anticipating of learned or imagined fear.

Besides that, according to Freud (1923), there are three kinds of anxiety due to the threat the ego faced against the id, the superego, and the external world (as cited in Compton, 1972).

The three kinds of anxiety are neurotic anxiety, moral anxiety, and reality anxiety. The neurotic anxiety is the unconscious fear causes by the id's urge or the innate impulse. It is the fear of losing control towards the id's impulse that will cause punishments. The fear of the id's impulse leads to the moral anxiety. Moral anxiety is developed from the fear of violating the ethic, standards, morals, and values from the superego. The moral anxiety is also the fear of feeling guilty or shame if one's internalized moral is violated. The last anxiety is the reality anxiety that is related to the external world. Any misfortunate or threatening real life events that were either learned or experienced. There are source or cause of fear that usually led one to experienced reality anxiety.

According to Compton (1972), anxiety is explained as a sense of helplessness that evoke response that precipitate the prehistory. Anxiety arises when in contact to external situations or as a reaction to a drive urge. It will either act as a signal that will leads to relatable action (or avert the impulse) or causes the experience of helplessness because of the overwhelmed adaptive defences. Anxiety is differentiated from depression as the reaction towards an anticipated calamity, meanwhile, depression is a reaction towards a previously experienced calamity (Brenner, 1982, as cited in Shill, 2004). Freud (1926) named the anticipating of danger in anxiety as "recognized, remembered, expected situation of helplessness. Furthermore, when a situation that imperils the depressive reaction appear, people will try to diminish or eliminate the unpleasure threat efficiently to escape the unpleasure of reliving the remembered threatening experience (Shill, 2004). The experiences that cause depression could also be the trigger for anxiety as people are afraid to relive in the same fearful event again. The process of reducing or eliminating the unpleasure is the defensive avoidance against depressive effect and known as the signal anxiety.