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THE EFFECT OF SLEEP QUALITY ON EXECUTIVE FUNCTIONS AND ITS REVIEW ACCORDING TO ISLAMIC VIEWS

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Abstract

This study aims to understand human executive function and the influence of sleep quality on executive function, as well as its role in daily life, according to Islamic perspectives. This research was conducted using an observational analytical method, which examines the relationship between the independent variable (sleep quality) and the dependent variable (executive function). The sample in this study were students from the Faculty of Medicine, Universitas Yarsi, graduating in 2023 and 2024. The results indicate that there are several stress triggers for students, including personal and social factors, lifestyle and culture, and factors arising from academic pressure. Students who have difficulty managing stress will experience increased tension, making it difficult to initiate sleep. The results showed that sleep quality did not have a significant relationship with the Trail Making Test B (TMT B) variable. It can be concluded that poor sleep quality does not necessarily mean poor executive function.

Keywords: Executive Functions, Sleep Quality, Islamic Views

Introduction

18% of the global population has experienced sleep disorders, with symptoms so severe that they cause mental distress. According to the National Sleep Foundation (NSF) recommended sleep duration guidelines, sleep deprivation, defined as <7 hours for adults, affects 37% of young adults aged 12-18.(1) 71% of college students sleep less than 8 hours a day, and 60% experience poor sleep quality. A study conducted in Jakarta with adolescents found a prevalence of sleep disorders of 62.9%. Sleep disorders are common among those of productive age, particularly during adolescence and adulthood. (1)

Sleep is a basic human need and an essential process, as the body recovers during sleep. Sleep is a state of consciousness during which a person transitions from complete to partial, allowing them to be awakened by sensory or other stimuli. (2) Therefore, a person's sleep quality is crucial to their quality of life. The better a person maintains their sleep, the better their quality of life will be.

Environmental factors, health status, lifestyle, diet, and academic stress can influence sleep quality. Sleep quality has seven assessment indicators: latency, difficulty initiating sleep, duration, sleep efficiency, sleep disturbances, use of sleeping medication, and disruption of daytime activities. Common health problems in adolescents and young adults are sleep disturbances, resulting in impaired concentration, impaired regulation, mood and behavior, and cognitive impairment. (3)

Sleep deprivation can be classified into two types: total sleep deprivation, characterized by episodes of alertness lasting the same or more than 24 hours, associated with increased sleepiness, memory impairment, failure to maintain alertness, and impaired decision-making. Second, chronic sleep restriction, characterized by a progressive reduction in total sleep hours over a period of time, associated with slowed processing speed, abnormalities in selective attention, and increased errors in judgment. (4)

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An instrument that can be used to measure a person's sleep quality is the Pittsburgh Sleep Quality Index (PSQI). [5] This is a structured questionnaire containing statements that selected respondents must complete. Poor sleep quality is indicated by a high PSQI score, with a score above 5 indicating poor sleep quality.

Aspects of cognitive function include attention, memory, language, viso-spatial abilities, and executive function (planning, organizing, and executing). [6] Executive function is an important domain of cognitive function related to sleep patterns and aging. [7] Executive function is the ability to regulate behavior, solve problems, and manage memory and thoughts. Executive function also includes self-regulation to manage daily activities and emotions to achieve specific goals. [8]

Neurological and psychological factors can influence executive function, such as dementia, stroke, and head trauma. Executive function resides in the prefrontal cortex (PFC) of the frontal lobe and is used during conscious awareness. [7] Unfamiliar circumstances can inhibit responses to achieve a goal. Skills associated with executive function involve allowing oneself to perceive stimuli from the environment, considering consequences, and integrating responses with common sense. [9] Three indicators of executive function: self-control or cognitive flexibility, inhibition (diversion of attention), and working memory, which form the overall coordination of processes involved in achieving a specific goal. [9]

The first domain, cognitive flexibility, is the ability to adjust behavior to changing environmental demands. This cognitive flexibility is essential for adapting, solving problems creatively, and thinking outside the box. This ability is crucial because it is adaptive and demonstrates the most significant changes in child and adolescent development. [9] The next domain is inhibition (inhibitory control/IC), the ability that functions to inhibit attention to distractors, thus allowing for continued selective attention. Inhibitory control involves the ability to select strategies, consider alternative behaviors, and attend to task switching and complex mental shifts. This ability is crucial for preventing responses. The final domain, working memory, is defined as the ability to monitor and input information and update memory content by replacing old items with newer, more relevant information. This ability primarily functions to facilitate and enhance brain function, storage, and retrieval, which are essential for learning and higher-level information processing. [9]

Cognitive function and brain activity are located in the frontal lobe, known as the prefrontal cortex (PFC), as an executive control area embedded in neural pathways, enabling a person to coordinate and integrate all data functions. [9]

Falling asleep is a state where a person's spirit leaves the body; the departure of the spirit is a sign of death. Falling asleep can be considered a mini-death. There is a secret to life when the soul leaves the human body. [10]

Islam teaches us that sleep is not merely a biological need. Sleep is a vital part of life, such as a short nap during the day (qailulah), which has been shown to restore the function of the Prefrontal Cortex (PFC), thereby improving executive function. [11]

A person who is asleep is essentially alive because they can show signs of life. However, during sleep, all aspects that should be felt are lost, such as the loss of mental awareness, understanding, normal reactions, and will. In other words, this state is a state of lost consciousness. Although consciousness is lost, the chemical and physical life activities of the body's cells continue automatically.

Method

This research is an observational analytical study, examining the relationship between the independent variable (sleep quality) and the dependent variable (executive function). The research design used was a cross-sectional study, where observations of both variables were conducted only once at the same time.

The population in this study were all students of the Faculty of Medicine, Universitas Yarsi, graduating in 2023 and 2024. The sample was drawn from this population using an appropriate sampling technique, namely probability sampling, with purposive sampling. Students from the Faculty of Medicine, Universitas Yarsi, graduating in 2023 and 2024, who agreed to participate and complete the questionnaire. However, students with cognitive impairments and those taking psychotropic medications were excluded from the sample selection. The sample size was determined using the Lemeshow formula, resulting in a sample size of n = 96.

The data collected were primary data, namely sleep quality (independent variable) and executive function (dependent variable). Data collection and measurement in this study used two methods. Direct measurements were used to collect data on respondents' executive function using the Indonesian version of the Montreal Cognitive Assessment (MoCA-Ina), Trail Making Test A, Trail Making Test B, digit span backward, and verbal fluency (CERAD). Meanwhile, indirect measurements were used to collect data on respondents' sleep quality using the Pittsburgh Sleep Quality Questionnaire (PSQI). The data collection instruments used were the Pittsburgh Sleep Quality Questionnaire (PSQI) questionnaire to assess sleep quality, and the Indonesian version of the Montreal Cognitive Assessment (MoCA-Ina), Trail Making Test A, Trail Making Test B, digit span backward, and verbal fluency (CERAD & MoCA).

The research data were analyzed using univariate and bivariate analyses. Univariate analysis was used to describe or provide an overview of the frequency of each variable, including sleep quality and executive function. Bivariate analysis was used to evaluate and determine the existence of a relationship between the two variables: sleep quality and executive function. The technique used in this analysis was the unpaired t-test for normally distributed data and the Man-Whitney test for non-normally distributed data.

Results

3.1 Univariate Test Results

Table 1. Frequency Distribution of Sleep Quality Using PSQI

Kualitas Tidur	n (%)
Good	14 (11,6)
Bad	107 (86,4)

This study involved 121 respondents from the Faculty of Medicine, Universitas YARSI, class of 2023. Based on the grouping of sleep quality using a questionnaire, 107 people were classified as having poor sleep quality and 14 people were classified as having good sleep quality.

Table 2. Frequency Distribution of TMT A Results

TMT A	n (%)
Normal	84 (69,4)
Disturbed	37 (30,6)

TMT A results grouping is divided into 2, namely normal and impaired. The results of the frequency distribution of the Trail Making Test A results where each respondent must connect 25 numbers in the correct order as quickly as possible. The results of data processing and frequency distribution of TMT A then revealed a clear picture, namely that 84 respondents (69.4%) had normal executive function, while 37 respondents (30.6%) had impaired executive function.

Table 3. Frequency Distribution of TMT B Result

TMT B	n (%)
Normal	113 (93,4)
Disturbed	8 (6,6)

The results of the frequency distribution of the Trail Making Test B results where each person must connect numbers and letters alternately and so on as quickly as possible without lifting the pen. The results of data processing and frequency distribution of TMT B then revealed a clear picture, namely that 113 respondents (93.4%) had normal executive function, while 8 respondents (6.6%) had impaired executive function.

Table 4. Frequency Distribution of MoCA Calculation Results

MoCA Calculation	n (%)
Normal	97 (80,1)
Disturbed	24 (19,9)

The results of data processing and frequency distribution of the MoCA calculation then revealed a clear picture, namely that 97 respondents (80.1%) had normal executive functions, while 24 respondents (19.9%) had impaired executive functions.

Table 5. Frequency Distribution of MoCA Abstraction Results

MoCA Abstraction	n (%)
Normal	72 (59,5)
Disturbed	49 (40,5)

The frequency distribution results of the MoCA Abstraction work by explaining the similarities between two concepts or objects given in pairs. The results of data processing and frequency distribution of the MoCA Abstraction then revealed a clear picture, namely that 72 respondents (59.5%) had normal executive function, while 49 (40.5%) had impaired executive function.

Table 6. Frequency Distribution of BDS Results

BDS	n (%)
Normal	103 (85,1)
Disturbed	16 (14,9)

The results of the frequency distribution of the BDS results, where respondents repeated the numbers in reverse order from the order they heard them. The results of the data processing and BDS frequency distribution then revealed a clear picture, namely that 103 respondents (85.1%) had normal executive function, while 16 (14.9%) had impaired executive function.

Table 7. Frequency Distribution of Verbal Fluency Test Results

Verbal Fluency	n (%)
Normal	121 (100)
Disturbed	0 (0)

The results of the Verbal Fluency Test showed that all 121 (100%) respondents had normal executive function. The Verbal Fluency Test requires the respondent to name as many animals as possible in one minute.

Table 8. Frequency Distribution of Verbal Fluency Test Results

Verbal Fluency	n (%)
Normal	18 (14,9)
Disturbed	103 (85,1)

The results of the Verbal Fluency Test showed that all 121 (100%) respondents had normal executive function. The Verbal Fluency Test requires the respondent to name as many animals as possible in one minute.

Bivariate Test Results

Table 9. Normality Test Result

	Normality Test Kolmogorov-Smirnov
	Sig.
PSQI	<0.001
Kalkulasi MoCA	<0.001
Abstraksi MoCA	<0.001
BDS	<0.001
Verbal Fluency	>0.001
Verbal Fluency MoCA	>0.001
TMT A	<0.001
TMT B	<0.001

The test results showed that most of the data were not normally distributed with a Sig. P value <0.05, namely the MoCA Calculation, MoCA Abstraction, BDS, TMT A and TMT B variables. In the Verbal Fluency and Verbal Fluency MoCA variables on the normal PSQI, the Sig. P> 0.05 results were obtained, meaning both variables were normally distributed. Data on variables that were not normally distributed will be continued with the Mann-Whitney test.

Table 10. Crosstabulation of Sleep Quality with Executive Function

	Std. deviation	Sig.(2-tailed)
MoCA Calculation	,567	0,145
MoCA Abstraction	,545	0,312
BDS	1,291	0,382
TMT A	18,589	0,105
TMT B	59,278	0,157

The results of the 2-tailed Mann-Whitney test showed a p-value >0.05 for the executive function instrument, indicating no significant relationship between sleep quality and executive function, thus rejecting H1.

Analysis of the effect of sleep quality on executive function, as represented by the MoCA Calculation, MoCA Abstraction, BDS, TMT A, TMT B, Verbal Fluency Test, and MoCA Verbal Fluency Test, showed no significant relationship. The analysis was based on the findings of the Kolmogorov-Smirnov normality test, which indicated non-normal data for some executive function instruments. Therefore, the Mann-Whitney test was chosen to test for mean differences, replacing the unsuitable Independent T-test.

Table 11. Crosstabulation of Sleep Quality with Executive Function

	Mean	Sig.(2-tailed)
Verbal Fluency Test	,839	0,531
Verbal Fluency Test MoCA	,690	0,636

The 2-tailed Sig. results of the unpaired T-test showed a p value >0.05 on the executive function instrument, which indicated no significant influence of sleep quality on executive function, thus H1 was rejected.

Discussion

The high number of YARSI Faculty of Medicine students in the Class of 2023 with poor sleep quality aligns with previous research which found that student stressors include personal and social factors, lifestyle and cultural factors, and factors arising from academic pressure. [5] Students who struggle to manage stress will experience increased tension, making it difficult to fall asleep.

The study found that sleep quality had no significant relationship with the Trail Making Test B (TMT B) variable. This contradicts research which found that the Trail Making Test is a neuropsychological tool designed to measure various aspects of executive function, such as cognitive flexibility, processing speed, sequencing, mental flexibility, and visual-motor skills. [12]

TMT B is used as a measure of Cognitive Flexibility, which is the ability to switch smoothly between two different rules; Working Memory, which requires respondents to remember two sequences simultaneously; and Inhibitory Control, which requires respondents to refrain from automatic responses, such as when the respondent's eyes see a number that is not the next sequence; they must immediately restrain their hand from moving.

It can be concluded that poor sleep quality does not necessarily mean poor executive function. This is in line with research conducted by Runtulalo *et al*. which showed no significant relationship between TMT B use and sleep quality. [2] Furthermore, the same area of cognitive function and sleep are involved, namely the prefrontal cortex. This likely occurs because the respondents were medical students who frequently engage in cognitive activities, namely activities related to thinking.

The MoCA calculation aims to measure aspects of working memory and information processing speed quickly and accurately. Working memory is a system that not only stores information but also manipulates it for tasks such as reasoning and comprehension. [9]

Research conducted by Esmaili *et al.* states that the dorsolateral prefrontal cortex (DL-PFC) is a brain area heavily involved in working memory. [13] This area is highly sensitive to the effects of sleep deprivation because poor sleep quality leads to decreased glucose metabolism in the PFC. [14]

The study's results align with Runtulao *et al.* found no relationship between sleep quality and executive function using the MoCA. One possible factor contributing to the lack of a significant relationship is age. [2] This is because the participating respondents were young, medical students, who are not yet experiencing declines in brain function.

Abstract: The MoCA measures cognitive flexibility, namely the ability to think creatively, see different perspectives, and quickly adapt to different situations. [15] This study showed no significant difference between MoCA abstraction and sleep quality, indicating that respondents' abstract thinking skills were relatively good despite poor sleep quality. This contradicts previous research which demonstrated a relationship between sleep quality and MoCA abstraction. [16]

Cognitive flexibility is associated with several regions of the PFC, particularly the anterior cingulate cortex (ACC), which connects the PFC to the limbic system. The more anterior the ACC, the more abstract thinking and logical thinking are involved. [17] Sleep phases, particularly REM sleep, are thought to play a role in memory consolidation that underlies abstraction ability. [18]

Education can influence MoCA abstraction results, as cognitive performance increases with education. Abstraction ability is generally formed automatically in long-term memory, making it less affected by poor sleep quality. [19]

Backward Digit Span is a measurement tool for assessing working memory. This ability works by temporarily storing information, then manipulating received information and inhibiting responses. [9] This study showed no significant difference between Backward Digit Span and sleep quality. This contradicts previous research which showed a relationship between Backward Digit Span use and sleep quality. [3]

Working memory depends on the performance of the DL-PFC and VL-PFC, which contribute to the maintenance and monitoring of information. [20] The quality of working memory. Poor sleep will cause a decrease in glucose in the PFC area, thereby reducing the performance of the DL-PFC and VL-PF.(14) Factors influencing the final outcome of the BDS are practice and learning, which can improve abilities and hone an individual's working memory. [17]

The TMT A is a measure of visual processing speed, attention, and visual-motor function, which requires the speed of an individual's thinking processes. [21] This study showed no significant difference between the TMT A and sleep quality. This contradicts previous research by Koutsonida et al., 2024, which showed a relationship between the TMT A and sleep quality.

This finding is inconsistent with research which showed a relationship between TMT A use and sleep quality. [14] Furthermore, the cognitive function and sleep areas are similar, namely the prefrontal cortex.

The speed of a person's thought processes is influenced by academic or educational factors, such as tasks requiring rapid visual scanning. Therefore, developing cognitive efficiency will affect TMT A score. [22]

The Verbal Fluency Test is used to measure the ability to retrieve information from memory and inhibitory control to avoid word repetition. [23] This study found no significant difference between the Verbal Fluency Test and sleep quality. This contrasts with previous research showed a significant relationship between the Verbal Fluency Test and sleep quality. [23]

The Verbal Fluency Test involves the frontal areas of the brain, specifically the left lateral prefrontal cortex.(24) Poor sleep deprivation will reduce the number of words produced in a limited time. However, the Verbal Fluency Test is also strongly influenced by stable knowledge, so educational level can also affect verbal fluency performance.

In the Islamic view, implementing the sleeping etiquette recommended by the Prophet Muhammad. can improve a person's sleep quality so that they can get a good quality of life. The interpretation of Fathul Qadhir explains that Allah created time into two parts: first, darkness, namely night, so that servants can rest from movement and fatigue and rest their souls from toiling and earning

a living. Second, light, namely day, so that they strive to obtain what is beneficial to them and increase their livelihood and achieve what is needed in the bright light, when nothing is hidden from them, whether great or small. Allah made the bright light for the day as a metaphor. (25)

The interpretation of Ath-Thabari also explains that if Allah awakens vision through day, it is only a time when sight can be seen, but it is not the day itself that creates vision. The alternation of day and night and the condition of humans during these two times are clear signs and evidence that the One who deserves to be worshipped is Allah alone, without any partner. He is the One who created night and day and separated them, the night for rest and the day for work. So, why should we worship gods who do not cause harm. (26)

According to the interpretation of the Ministry of Religious Affairs, Allah affirms to Muslims that He created the night for humans so that they could rest during it. He also created the day, illuminated by the light of the sun, so that humans could seek His bounty. The alternation of day and night is regulated by Allah through His laws. By His laws, celestial bodies orbit in their predetermined orbits. In regulating the orbits of celestial bodies, Allah does not need other gods to assist; rather, with His supreme wisdom, He has the power to regulate the orbits of these objects. Because of the orbits of these celestial bodies, differences in time and changes in weather arise, allowing humans to choose the appropriate time to meet their needs and fulfill their obligations to their Creator (Ministry of Religious Affairs of the Republic of Indonesia, 2010).

The conclusion that can be drawn from the three interpretations above is that the changing of day and night is not simply a natural phenomenon, but a divine system that regulates the rhythm of human life. Night is a time for rest and tranquility, and is crucial for maintaining a balanced life, while day is a time for effort, work, and earning a living. This alternation of the two occurs regularly due to God's law, without the assistance of any other creature. This is evidence of God's power.

Sleep is a sign of Allah SWT's power contained in (Qs. Ar-Rum/30: 23)

وَمِنْ اٰيٰتِهٖ مَنَامُكُمْ بِالَّيْلِ وَالنَّهَارِ وَابْتِغَآؤُكُمْ مِّنْ فَضْلِهٖۗ اِنَّ فِيْ ذٰلِكَ لَاٰيٰتٍ

And the Most High (of Allah), Among His signs is your sleep by night and by day, and your seeking of His bounty. Indeed, in that are signs for a people who listen."

Conclusion

Based on the research results, the following conclusions can be drawn:

1. Of the total respondents, 107 (88.4%) reported poor sleep quality.
2. There was no significant relationship between sleep quality and executive function, with a p-value > 0.05.
3. From an Islamic perspective, practicing sleep etiquette recommended by the Prophet Muhammad (peace be upon him) can improve sleep quality, thus achieving a better quality of life.

References

[1] Eda S, Suwarni A, Herawati VD, Keperawatan PS, Sains F, Surakarta US, et al. HUBUNGAN KUALITAS TIDUR DENGAN FUNGSI KOGNITIF PADA MAHASISWA UNIVERSITAS SAHID SURAKARTA. JIKI. 2024;17(1):35–40.

[2] Runtulalo SN, Tedjasukmana R, Kesehatan I, Kristen U, Wacana K, Saraf IP, et al. Hubungan Kualitas Tidur dengan Fungsi Eksekutif pada Pekerja Shift dan Non Shift The Relationship Between Sleep Quality and Executive Functions in Shift and Non Shift Workers. Jurnal Kedokteran Meditek. 2020;27(3):211–6.

[3] Alif MR, Nurhidayati IR, Maulana AY. Hubungan Kualitas Tidur Dengan Memori Kerja Menggunakan Forward Dan Backward Digit Span Test Pada Peserta Didik Fakultas Kedokteran The Correlation Between Sleep Quality And Working Memory Using Forward And Backward Digit Span Test In Medical Faculty Stud. Junior Medical Journal. 2022;1(3):331–42.

[4] Lima NC, Kirov R, Almondes KM de. Impairment of executive functions due to sleep alterations : An integrative review on the use of P. Frontiers in Neuroscience. 2022;16:1–28.

[5] Haryati, Yunaningsi SP, RAF J. FAKTOR YANG MEMPENGARUHI KUALITAS TIDUR MAHASISWA FAKULTAS KEDOKTERAN UNIVERSITAS HALU OLEO. Jurnal Surya Medika. 2020;5(2):22–33.

[6] Made D, Viandara K, Sri I, Novianti W, Tri K, Suparwati A, et al. HUBUNGAN ANTARA KUALITAS TIDUR DENGAN FUNGSI KOGNITIF PADA LANSIA DI BANJAR KALANGANYAR DESA DANGIN PURI KAJA KECAMATAN DENPASAR UTARA. Prepotif. 2022;6.

[7] Sen A, Tai XY. Sleep Duration and Executive Function in Adults. Current Neurology and Neuroscience Reports [Internet]. 2023;23(11):801–13. Available from: https://doi.org/10.1007/s11910-023-01309-8

[8] Muchlisin MA, Juhriati I, Anggraeni D, Meiwaty R. Peran Executive Function (Fungsi Eksekutif) terhadap Kesiapan Sekolah : Pemahaman Guru PAUD. Indonesian Journal of Early Childhood: Jurnal Dunia Anak Usia Dini. 2023;5(1):13–22.

[9] Tyas A, Ayomi R, Widyorini E, Roswita MY. Hubungan Inteligensi Dengan Fungsi Eksekutif Pada Anak Gifted Relationship Between Intelligence And Executive Function To Gifted Children. Jurnal IlmiahPsikologi Candrajiwa. 2021;6(2):134–50.

[10] Mardlatillah SD, Nurjannah. Konsep Tidur dalam Perspektif Psikologi dan Islam. Happiness. 2023;7(June):65–71.

[11] Tumiran MA, Rahman NNA, Saat RM, Kabir N, Zulkifli MY, Adli DSH. The Concept of Qailulah (Midday Napping) from Neuroscientific and Islamic Perspectives. Journal of Religion Health. 2018;57(4):1363-1375.

[12] Maulana R, Wahyudi K, Victoriana E, Kuntari CMISR, Ong PA, Sulastri A, et al. Psychometric Properties of the Trail-Making Test in Dementia Population. Jurnal Psikologi. 2025;52(1):1–14.

[13] Candidate ME, Farhud D, Poushaneh K, Baghdassarians A. Executive Functions : Inferences from Behavior , Brain and Genetics. International Journal of Behavioral Sciences. 2022;15(4):301–11.

[14] Satterfield B, Killgore WDS. Sleep loss, executive function, and decision-making. In: Sleep and Health. 2019. p. 23.

[15] Hermahayu, Wimbarti S. PERKEMBANGAN EXECUTIVE FUNCTIONS PADA ANAK PRA SEKOLAH DI KOTA MAGELANG. Edukasi. 2017;9(2):121–37.

[16] Fachlefi S, Rambe A. Hubungan Kualitas Tidur dan Fungsi Kognitif Siswa MAN Binjai. SCRIPTA SCORE Scientific Medical Journal. 2021;3:8–16.

[17] Siregar NR, Keguruan F, Psikologi J, Oleo UH. Working Memory Versus Inhibitory Control : Sebuah Kajian Neuropsikologi Mengenai Peran Informasi Tidak Relevan Working Memory

versus Inhibitory Control : A Neuropsycholoical Study of Irrelevant Information. 2021;29(1):64–91.
[18] Manoppo MW, Pitoy FF, Abigael T. Kualitas Tidur pada Mahasiswa Profesi Ners Universitas Klabat. MAHESA : Malahayati Health Student Journal. 2023;3:2098–107.
[19] Ong R, Yap CW, Ge L. Regression-based normative scores for the Montreal Cognitive Assessment (MoCA) in an Asian population. Sci Rep. 2025;15.
[20] Cristofori I, Cohen-zimerman S, Grafman J. Executive functions. In: Handbook ofClinical Neurology, Vol 163 (3rd series). Elsevier; 2019. p. 23.
[21] Andrian Y, Kurniadi A, Maja J, Warouw F. THE ASSOCIATION BETWEEN MEDITATION AND COGNITIVE PROCESSING SPEED IN YOUNG ADULT IN MANADO. Jurnal Sinaps. 2018;
[22] Widhianingtanti LT, Luijtelaar G Van, Suryani AO, Sulastri A. Indonesian Trail Making Test : Analysis of Psychometric Properties , Effects of Demographic Variables , and Norms for Javanese Adults. Jurnal Psikologi. 2022;49(2):104–22.
[23] Wangi PH, Handajani YS, Turana Y. Artikel Penelitian Verbal Fluency Sebagai Domain Kognitif Yang Paling Memengaruhi Aktivitas Fungsional Lansia Di Pulau Jawa Verbal Fluency As The Cognitive Domain That Most Affect The Functional Activity In The Elderly In Java Island. Neurona. 2022;39(1):28–35.
[24] Siregar NR. "Cool" dan "Hot" Brain Executive Functioning dan Perfomansi Akademik Siswa. Buletin Psikologi. 2018;26(97).
[25] Syaukani A, Ibrahim S. Tafsir Fathul Qadir. Edisi 1. Jakarta: Pustaka Azzam; 2012.
[26] Thabari AJMBJA. Tafsir Ath-Thabari. Edisis Per. Jakarta: Pustaka Azzam; 2009.