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RESEARCH ARTICLE

The Influence of Individual Characteristics, Workload, Work Shift, and Work Fatigue on The Performance of Aviation Security Employees at Sultan Hasanuddin International Airport in Makassar

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ABSTRACT

One of the essential requirements for ensuring the security and safety of air travel at an airport is the presence of airport security personnel, referred to as Aviation Security (AVSEC). AVSEC plays a crucial role in safeguarding the security and safety of flights at the airport, which can lead to work fatigue. This fatigue may negatively impact AVSEC's performance, hindering their ability to perform their duties effectively and efficiently. This study examines how individual characteristics, workload, and work shifts influence performance through work fatigue among AVSEC employees at Sultan Hasanuddin International Airport in Makassar. A cross-sectional design was utilized, involving a sample of 110 individuals selected through proportional random sampling. Workload was assessed using the NASA-TLX questionnaire and a pulse oximeter, while work fatigue was evaluated through a questionnaire (KAUPK2) and a reaction timer. Data analysis was performed using path analysis with AMOS software. The results reveal that age has a direct effect on AVSEC performance ($p = 0.026$), whereas gender, tenure, nutritional status, physical workload, mental workload, and work shift do not. Both physical ($p = 0.001$) and mental workloads ($p = 0.008$) indirectly effect performance through subjective work fatigue. The study highlights the necessity for AVSEC employees to maintain their physical and mental well-being through effective workload management, proper nutrition, and sufficient rest. These findings provide valuable insights and recommendations for airport management to support AVSEC's daily operations, helping to prevent declines in efficiency, work fatigue, and reduce performance.

INTRODUCTION

Indonesia is the largest archipelagic country in the world, consisting of thousands of large and small islands. Therefore, there are challengers in connecting communities across all regions of Indonesia, whether by land, sea, or air. To address these challenges and support inter-regional movement, Indonesia is supported by land, sea, and air transportation (Hidayat, Triadmojo, & Utomo, 2022).

Among the existing of transportation, air transportation is highly favoured by the public. This is because air transport is superior and more efficient in terms of time and distance compared to other modes of transportation. Air transport is the only fast, efficient, and economical alternative for inter-

island and inter-regional transportation (Yunika & Astutik, 2023). To create an effective air transportation system, it is necessary to build airports as gateways for the economy, business, education, and other activities from various regions, areas, and countries Airports are used for the landing and take-off of aircraft, boarding and alighting of passengers, loading and unloading of cargo and mail, and are equipped with flight safety facilities, serving as transfer points between different modes of transportation (I. Ardiansyah, 2021).

To support the security and safety of airport operations, the implementation of Occupational Health and Safety (OHS) in aviation is essential. Aviation OHS is a strategic effort to operate aircraft safety from the preparation for take-off until arrival at the destination airport. Aviation OHS also plays a role in ensuring flight comfort and improving the overall quality of aviation. Efforts to enhance the quality of the aviation industry must encompass safety and health aspects in every planning stage (Saleh, 2017). In addition to the implementation of aviation OHS, one of the requirements to support the security and safety of an airport is the presence of Aviation Security (AVSEC) personnel. AVSEC refers to Aviation Security personnel who are required to possess a license or certificate of competence and are assigned responsibilities in the field of aviation security (Yudianto & Wijaya, 2023).

Every individual, including an AVSEC employee, faces their own challenges related to their work, ranging from job demands and workload to the work environment (B. D. G. S. Putri & Izzati, 2022). One of the OHS issues that can threaten the safety and health of workers and trigger workplace accidents is fatigue. Work fatigue is a condition characterized by decrease in an individual's efficiency and endurance while working. The term fatigue refers to a state diminished physical or mental capacity to perform activities, resulting in reduced work capacity and bodily endurance (Ariyanto, 2021). The International Civil Aviation Organization (ICAO) defines fatigue as a physiological condition in which physical or mental abilities are diminished due to sleep loss, prolonged wakefulness, circadian phase, and excessive workload, which can impair the ability to maintain security and safety during operational processes (Saleh, 2018a).

The World Health Organization (WHO) states that severe fatigue is the second leading cause of death after heart disease. According to International Labour Organization data (2016), approximately 32% of workers worldwide experience fatigue due to their jobs. The rate of severe fatigue complaints among workers globally ranges from 18,3% to 27%, with a prevalence rate of fatigue in the industry at 45% (Innah, Muhammad Khidri Alwi, Fatmah Afrianty Gobel, & Abbas, 2021). The National Safety Council (NSC) conducted a study of 2.010 workers in the United States in 2017 and the results indicated that approximately 13% of workplace accidents occur due to fatigue factors. It was found that 97% of workers have at least one factor, and more than 80% have two or more risk factors for work fatigue. About 40% of the workforce in the United States reported experiencing work fatigue, which leads to increased absenteeism, decreased productivity, and a higher number of workplace accidents. Based on data from The Directorate General of Labor Supervision in 2012, there were 847 workplace accident cases in Indonesia, with 36% occurring due to high levels of work fatigue. Additionally, data from the Ministry of Manpower and Transmigration (2014) indicates that an average of 414 workplace accidents occur daily in Indonesia, with 27,8% caused by significant fatigue (Safira, Pulungan, & Arbitera, 2020).

Factors causing fatigue vary widely. Suma'mur identifies several significant factors, including age, gender, nutritional status, workload, body size, and working hours. The work environment, such as noise, heat, poor lighting, and vibrations, can also lead to discomfort and fatigue. Tarwaka also highlights individual characteristics, job factors (monotonous tasks, long hours, and workload), and psychological factors (work environment and noise) as contributors to work fatigue (Y. P. Putri, Puji, & Ratnaningtyas, 2022).

Individual characteristics, such as age, can lead to work fatigue. As people age, their physical condition declines, affecting vision, hearing, memory, mobility, and decision-making. Workers aged 40-50 experience fatigue more quickly due to bodily degeneration and decreased muscle strength. Thus, age should be considered when assigning tasks (Ardinendradewi, Setyaningsih, & Kurniawan, 2022). In addition to age, work tenure also affects work fatigue. Longer tenure can have both positive and negative impacts. Positively, more experience can enhance job performance. Conversely, prolonged work can lead to fatigue and boredom, increasing exposure to workplace hazards (S. Russeng, Muhammad Saleh, Thamrin, & Aulia Utami S, 2019).

Gender can also influence fatigue due to differences in physical ability and muscle strength between men and women. Women generally have less muscle strength and experience monthly biological cycles, such as menstruation, which can cause pain and increased fatigue, especially during dysmenorrhea (Februanda, Sedionoto, & Duma, 2022). Nutritional status is another factor that can lead to worker fatigue. Poor nutrition results in higher fatigue levels, as inadequate intake of nutrients from irregular eating patterns leads to decreased energy and productivity. This condition can also reduce motor nerve sensitivity, making individuals more prone to fatigue and stress (Komalig & Kawoka, 2018).

High workload can lead to fatigue, illness, and other issues that decrease performance. High job demands are considered predictors of fatigue, with greater workloads resulting in increased fatigue. Both high workload and fatigue contribute to reduced daily work performance (Fan & Smith, 2017). Shift work can also cause fatigue. Shift work refers to a specific work schedule designed to maintain continuous operations. Naturally, the environment dictates work and rest periods, with daylight encouraging work and darkness promoting rest. Suma'mur notes that night shift workers experience higher fatigue levels compared to those working in the morning or afternoon due to significantly less sleep or rest during the day (Juliana, Camelia, & Rahmiwati, 2018).

Performance is the quality and quantity of work achieved by an individual in fulfilling their assigned responsibilities. A company is considered to perform well when it aligns the workload given to an individual with that individual's capabilities. Additionally, having suitable individual characteristics that match the company's needs is crucial, as the right employee selection impacts performance outcomes (Kusumaningrum, Sunardi, & Saleh, 2016). Companies must also schedule shifts according to employees' abilities and capacities to optimize performance. Misalignment in shift schedules can lead to suboptimal employee performance (Syahrizal, Hidayati, & Waliamin, 2023).

Based on observations at Sultan Hasanuddin International Airport, AVSEC personnel work in various areas. This includes the departure gate, ticketing area, baggage area, screening area, and the interior of the airport. The AVSEC personnel perform their duties while standing, sometimes running from one place to another, assisting passengers in difficulty, conducting baggage screenings, directing passengers, patrolling the airport area, and so on. Fatigue is common in the 24/7 aviation sector due to continuous operations and high flight volumes, which can impair focus and reduce AVSEC performance (Rahayu & Kurniawan, 2022; Saleh, 2018b).

Therefore, the researchers intend to conduct a study on AVSEC, specifically regarding the influence of individual characteristics, workload, and work shifts on AVSEC performance through work-related fatigue. Understanding these factors is crucial for improving working conditions and enhancing airport security.

MATERIALS AND METHODS

This study employs a quantitative, cross-sectional observational design to examine the relationships between independent variables (age, gender, tenure, nutritional status, workload, and work shift), the intervening variable (work fatigue), and the dependent variable (performance). Conducted from July to August 2024 at Sultan Hasanuddin International Airport in Makassar, the research targets all

398 AVSEC employees. A proportional random sampling technique was used, ensuring each member had an equal chance of selection. The sample size, calculated using the Lemeshow formula, consists of 110 individuals: 67 from the protection section, 42 from the screening section, and 1 staff. The study used various instruments, including questionnaires for respondent willingness, personal data (name, age, gender, tenure, work shift), work fatigue (KAUPK2), employee performance, and mental workload (NASA-TLX). Measurement tools included a scale for weight, a microtoice for height, a pulse oximeter for physical workload, and a reaction timer app for work fatigue. The performance, KAUPK2, and NASA-TLX questionnaires were tested in a pilot study involving 35 respondents, yielding validity scores of 0.845, 0.851, and 0.878. Additionally, reliability was assessed using Cronbach's alpha coefficients, which were found to be 0.760, 0.793, and 0.813.

Nutritional status is assessed using Body Mass Index (BMI), calculated as weight in kg divided by height in meters squared, with a normal range of 18.5-25.0 kg/m^2. Values <18.5 or >25.0 kg/m^2 indicate abnormal status (P2PTM, 2018). Physical workload is evaluated through Cardiovascular Load percentages (%CLV) via a pulse oximeter, categorized as no fatigue (<30%), need for improvement (30 - <60%), short-term work (60 - <80%), immediate action needed (80 - <100%), and prohibited activities (>100%) (Tarwaka, Bakri, & Sudiajeng, 2004). Mental workload is measured with NASA-TLX questionnaire, where scores <50 indicate light workload, 50 – 80 suggest moderate, and >80 reflect heavy workload (U. L. Putri & Handayani, 2019). Subjective work fatigue is assessed using the KAUPK2 questionnaire for measuring work fatigue, with scores ≥62% indicating fatigue (Ramdan, 2018). Objective work fatigue is measured with a reaction timer app, where response times ≥580 ms indicate severe fatigue, >410 - <580 ms indicate moderate, and >240 - <410 ms indicate light fatigue (Amalia & Widajati, 2019). Performance is evaluated through a six-question questionnaire, with scores ≥60% signifying a decline in performance (Paramban, 2018).

Statistical analysis of the data was conducted using path analysis with Analysis of Moment Structures (AMOS), a software specifically designed for structural analysis and modelling relationships between variables. This analysis model is used because this study wants to find out the direct and indirect effects of the existing variable. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 illustrates the direct effect hypothesis test results. The results show that mental workload and physical workload significantly impacts subjective work fatigue. Age, gender, and tenure are not significant factors. For objective fatigue, only mental workload is significant. Regarding performance, age, subjective and objective fatigue influence performance.

Table 1. Direct Effect Hypothesis Test Results

Connection			*Estimate*	S.E	C.R	P
Age	→	Work Fatigue	0,097	0,081	1,189	0,234
Gender	→	Work Fatigue	0,060	0,155	0,387	0,698
Tenure	→	Work Fatigue	0,127	0,139	0,911	0,362
Nutritional Status	→	Work Fatigue	-0,084	0,103	-0,816	0,415
Mental Workload	→	Work Fatigue	0,231	0,085	2,723	0,006*
Physical Workload	→	Work Fatigue	0,297	0,087	3,428	***
Work Shift	→	Work Fatigue	0,064	0,109	0,584	0,560
Age	→	Reaction timer	0,074	0,073	1,012	0,312
Gender	→	Reaction timer	-0,020	0,140	-0,141	0,888
Tenure	→	Reaction timer	0,071	0,126	0,563	0,574
Nutritional Status	→	Reaction timer	-0,139	0,093	-1,495	0,135

Connection			*Estimate*	S.E	C.R	P
Mental Workload	→	Reaction timer	0,282	0,077	3,686	0,000*
Physical Workload	→	Reaction timer	0,136	0,078	1,743	0,081
Work Shift	→	Reaction timer	-0,004	0,098	-0,039	0,969
Age	→	Performance	0,118	0,053	2,225	0,026*
Gender	→	Performance	-0,085	0,100	-0,856	0,392
Tenure	→	Performance	0,083	0,090	0,919	0,358
Nutritional Status	→	Performance	-0,110	0,067	-1,647	0,100
Mental Workload	→	Performance	0,096	0,059	1,642	0,101
Physical Workload	→	Performance	0,100	0,059	1,708	0,088
Work Shift	→	Performance	-0,123	0,070	-1,756	0,079
Work Fatigue	→	Performance	0,660	0,064	10,370	0,000*
Reaction Timer	→	Performance	0,153	0,071	2,171	0,030*

*p-value < 0,05 : There is a significant influence

Based on table 2, the indirect effect hypothesis test results show that mental and physical workload significantly affects performance through subjective work fatigue. Other factors like age, gender, tenure, nutritional status, and work shifts do not significantly impact performance through work fatigue, as their effects are not strong enough in this study

Tabel 2. Indirect Effect Hypothesis Test Results

	t-statistics	Std. Error	*p-value*
Age→Work Fatigue→Performance	1,190	0,054	0,234
Age→Reaction Timer→Performance	0,917	0,012	0,359
Gender→Work Fatigue→Performance	0,387	0,102	0,699
Gender→Reaction Timer→Performance	-0,143	0,021	0,887
Tenure→Work Fatigue→Performance	0,910	0,092	0,363
Tenure→Reaction Timer→Performance	0,545	0,020	0,586
Nutritional Status→Work Fatigue→Performance	-0,813	0,068	0,416
Nutritional Status→Reaction Timer→Performance	-1,228	0,017	0,219
Mental Workload→Work Fatigue→Performance	2,628	0,058	0,008*
Mental Workload→Reaction Timer→Performance	1,857	0,023	0,063
Physical Workload→Work Fatigue→Performance	3,241	0,060	0,001*
Physical Workload→Reaction Timer→Performance	1,332	0,011	0,183
Work Shift→Work Fatigue→Performance	0,586	0,072	0,558
Work Shift→Reaction Timer→Performance	-1,362	0,014	0,173

*p-value < 0,05 : There is a significant influence

Figure 1 displays the path analysis of this study. In this study, two path models will be developed. The first model examines the impact of individual characteristics, workload, and work shift on performance through subjective work fatigue, while the second model investigates the impact of individual characteristic, workload, and shift work on performance through objective work fatigue. The following figure illustrates the construction of the path analysis model. In this model, subjective and objective work fatigue serve as intervening variables in modelling the relationships between individual characteristics, workload, shift work, and performance.

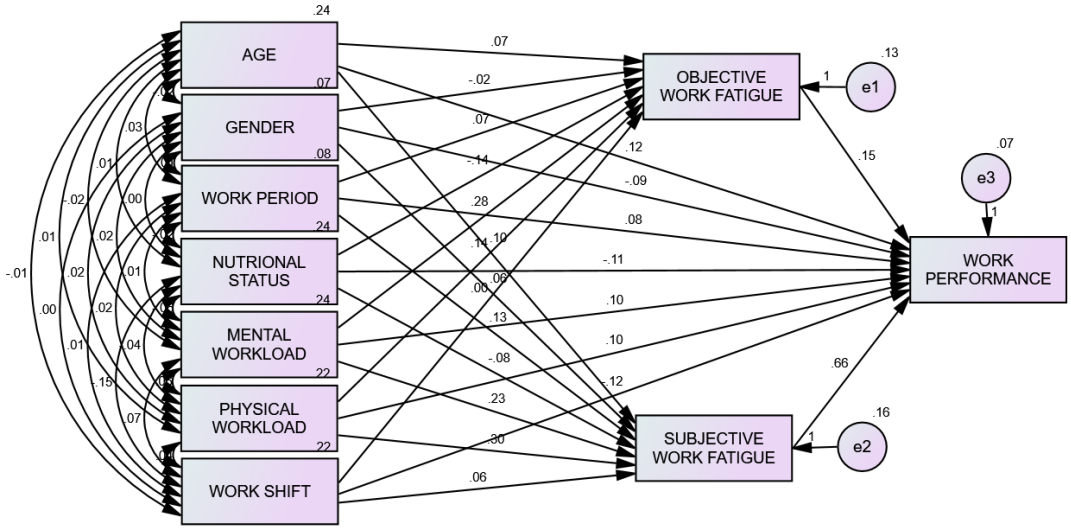

Figure 1. Path Analysis

Figure 2 displays the statistically significant path analysis model based on table 1 and table 2 results in this study. A straight line indicates a significant direct influence, shows that mental workload and physical workload significantly impacts subjective work fatigue and regarding performance, age, subjective and objective fatigue influence performance. Meanwhile, a dashed line indicates a significant indirect influence, shows that mental and physical workload significantly affects performance through subjective work fatigue.

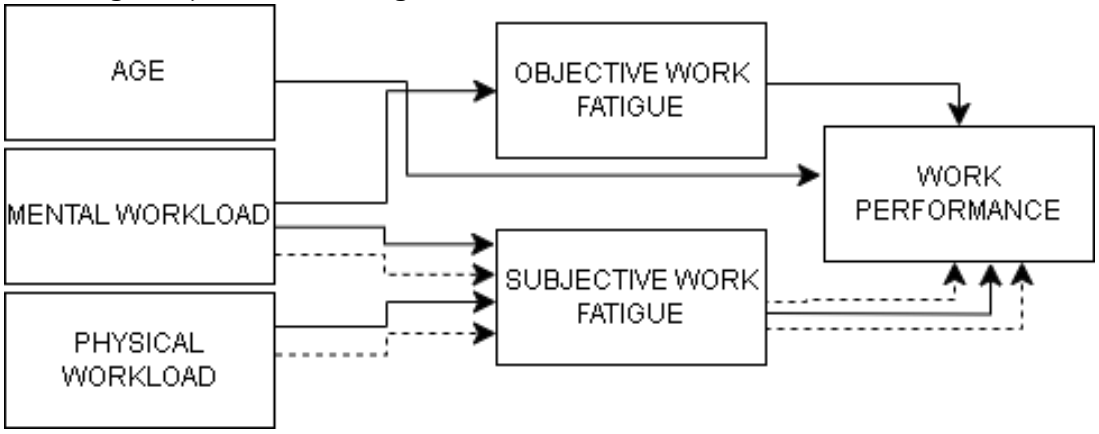

Figure 2. Statistically Significant Path Analysis Model

DISCUSSION

The Influence of Age on Work Fatigue

The analysis reveals that age does not significantly impact work fatigue, both subjective (questionnaires) and objective (reaction timer). Workers over 40 may experience muscle decline but maintain emotional stability and adaptability, allowing smoother work. In contrast, workers under 40, despite higher skills, often face fatigue due to carelessness (Sitanggang, Nabela, Putra, & Iqbal, 2024). This aligns with Salsabila and Mulyono's research, which found no relationship between age and work fatigue. Most dome installation workers are aged ≤35, while those over 50 experience only mild fatigue, benefiting from greater experience and emotional stability than younger workers which contributes to better performance (Salsabila & Mulyono, 2021).

The Influence of Gender on Work Fatigue

The analysis indicates that gender does not significantly affect work fatigue, both subjective and objective. Based on the observations made by the researcher on the AVSEC employees at Sultan Hasanuddin International Airport, both men and women share the same responsibilities and can serve as leaders without gender distinction. Factors like tenure and workload have a greater impact on fatigue than gender. This aligns with Wari and Widajati's findings, showing no relationship between gender and burnout. All employees face equal demands and risks of burnout, regardless of gender (Wari & Widajati, 2022).

The Influence of Tenure on Work Fatigue

The analysis shows that tenure does not significantly impact subjective and objective work fatigue. Interviews with AVSEC reveal that they have adapted to job demands and able to take a little break during work, reducing fatigue regardless of their tenure and work duration. This aligns with Widyanti and Febriyanto's findings, which show no relationship between tenure and work fatigue. In fact, workers with longer tenure experience higher levels of fatigue. Tenure can affect workers positively, through increased experience, or negatively, by causing fatigue and boredom due to monotonous activities (Widyanti & Febriyanto, 2020).

The Influence of Nutritional Status on Work Fatigue

The analysis shows that nutritional status does not significantly impact subjective and objective work fatigue. Despite having normal nutritional status, fatigue may arise from factors like repetitive tasks, which can lead to boredom and decreased muscle strength. This aligns with Suryaningtyas and Widajati's findings, noting that workers with underweight or overweight statuses also experience fatigue, partly due to inadequate meal allowances (Suryaningtyas & Widajati, 2017).

The Influence of Physical Workload on Work Fatigue

The analysis shows that physical workload significantly impacts subjective work fatigue, but not objective fatigue. Subjective fatigue is influenced by individual perception, stress, physical condition, and environmental factors like temperature and comfort. This aligns with Maulana, Widhiarso, and Dewi's findings on tempeh chip workers. Fatigue varies among workers due to their coping abilities, and an unbalanced workload can lead to excessive fatigue (Maulana, Widhiarso, & Dewi, 2023). While physical workload may not objectively affect fatigue, psychological factors and individual endurance play significant roles. Task variation, good environmental conditions, experience, and adequate rest can mitigate negative impacts. Yusfitrida, Pawitra, and Gunawan also found no relationship between physical workload and objective fatigue at PT. XYZ. Fitter workers reported higher physical workload and fatigue due to heavy tasks, work stress, and non-ergonomic conditions (Yusfitrida, Pawitra, & Gunawan, 2024).

The Influence of Mental Workload on Work Fatigue

Mental workload significantly impacts both subjective and objective work fatigue. Observations and interviews with AVSEC employees reveal that their demanding roles lead to physical fatigue from managing large passenger volumes and maintaining focus. They also face mental fatigue from monitoring activities and inspecting items, which can result in conflicts with passengers. This aligns with Allo et al.'s research, which found a relationship between mental workload and fatigue among nurses at Hasanuddin University Hospital, indicating that higher mental workloads lead to increased fatigue and negatively affect health, causing stress and exhaustion (Allo et al., 2020).

The Influence of Work Shift on Work Fatigue

Analysis indicates that work shifts do not significantly impact subjective and objective work fatigue. Based on interviews, AVSEC personnel adapt their sleep patterns and daily activities, benefiting from

sufficient rest and supportive work conditions, which help reduce fatigue. This aligns with Al'Qadir's research, which also found no relationship between work shift and fatigue among AVSE employees, attributed to flexible airport operational hours and the fact that employees are only on standby during night shifts (Al'Qadir, 2021).

The Influence of Age on Performance

The analysis shows that age significantly influences performance. The increase in worker age is often linked to a decline in performance, influenced by factors such as motivation, work discipline, and work environment. Research indicates that older workers tend to experience a decrease in performance due to reduced physical and mental capabilities (Prasetyo, Permatasari, & Hanim, 2023). Additionally, motivation and enthusiasm can also impact performance, as older individuals may feel less motivated or less enthusiastic about their work. Health is another factor that affect performance, as the increased risk of chronic diseases or injuries may require individuals to take sick leave or reduce their working hours. This study aligns with Sari, As'ad, and Kuncoro's research, which found a significant relationship between age and the performance of educational staff at State Vocational High School 3 of Banjarbaru. While performance may decline with age, older employees bring valuable experience, judgment, and strong work ethic, despite being perceived as less flexible with new technology (Sari, As'ad, & Kuncoro, 2021).

The Influence of Gender on Performance

The analysis shows that gender does not significantly affect performance. Development and empowerment of employees, regardless of gender, indicate that quality and quantity of work by both men and women tend to be comparable (Ariyanti, Wiyono, Timan, Burhanuddin, & Mustiningsih, 2020). This finding aligns with research by Aspebri, Zaman, and Suryani, which found no relationship between gender and employee performance in healthcare services at Lubai Ulu Regional General Hospital. Overall, performance is determined by task achievements, not gender (Aspebri, Zaman, & Suryani, 2023).

The Influence of Tenure on Performance

The analysis reveals that tenure does not significantly affect performance. Employees with shorter tenures can outperform their longer-tenured counterparts if they more skilled and motivated. This finding aligns with Nur, Anwary, and Aquarista, which found no relationship between work experience and performance at the Teluk Tiram Community Health Center. Both 74,1% of experienced and 92,3% of new employees perform well. Experienced employees have skills, while new employees show high enthusiasm for learning, indicating that work tenure does not impact performance (Nur, Anwary, & Aquarista, 2022).

The Influence of Nutritional Status on Performance

The analysis show that nutritional status does not significantly affect performance. Individuals can adapt to different nutrition levels, and performance is also shaped by work quality and available resources. This aligns with Majid's research, which found no significant impact of nutritional status on the MV Vinca boat crew's performance. Nonetheless, nutritional status is still important for works health and the risk of degenerative diseases, warranting attention (Majid, 2023).

The Influence of Workload on Performance

The analysis shows that physical and mental workloads do not significantly impact performance. When tasks are simple, workload has less effect, allowing other factors to dominate. This aligns with research by Rahmat, Russeng, and Hardi, which found no impact of physical workload on nurses at Labuang Baji Makassar Regional General Hospital (p-value 0.061>0.05). The nurses' average age (32-47) and education level (D3 and S1 Ners) indicate they are well-trained, so physical activity is not

burden (Rahmat, Russeng, & Hardi S, 2024). Similarly, Pourteimour et al. found no significant effect of mental workload on nurses' performance in Iran (Pourteimour, Yaghmaei, & Babamohamadi, 2021). Excessive mental workload due to task demands does not always hinder performance; on the contrary, it can motivate individuals to work towards achieving optimal result (Betan, Zaenal, Hamzah, Abdullah, & Hilmiah, 2023).

The Influence of Work Shift on Performance

The analysis result indicate that work shifts do not have significant impact on performance. Shift work does not always affect performance due to several factors. Individuals can adapt to different work patterns, and a supportive work environment can enhance performance, regardless of the shifts they work. The study by Subandi et al. indicates that work shifts do not have a significant effect on the performance of AVSEC employees at Sultan Muhammad Salahuddin Airport in West Nusa Tenggara (Subandi, Yuliantoharinugroho, Rofik, & Suciyanti, 2024).

The Influence of Work Fatigue on Performance

The analysis shows that both subjective and objective work fatigue significantly impact performance. Subjective and objective fatigue can affect performance. Subjective fatigue, which relates to an individual's feelings about their fatigue, can reduce concentration, motivation, and work efficiency. Meanwhile, objective fatigue, associated with decreased physical stamina and cognitive function, can lower efficiency and increase the risk of errors. Worker fatigue is a serious issue in modern organizations and is difficult for employers to identify. Symptoms include physical decline and decreased efficiency, which can reduce productivity and performance (Saleh et al., 2022).

The Influence of Age on Performance through Work Fatigue

The hypothesis test result show that age does not significantly impact performance through subjective or objective work fatigue. Research indicates no significant relationship between age and performance affected by work fatigue. A study by Fan and Smith found that subjective fatigue increases with accumulation of fatigue over time rather than age (Fan, Smith, Plinio, & Smith, 2020). They noted that subjective fatigue increases with work duration., but age does not influence this relationship. Thus, while work fatigue can affect performance, age does not indirectly impact performance through work fatigue.

The Influence of Gender on Performance through Work Fatigue

This study found that gender does not have a significant impact on performance through work fatigue, whether subjective or objective. These results are consistent with Saptadi and Fataruba's study, which showed no relationship between gender and feelings of work fatigue, confirming that both men and women experience similar level of fatigue (Saptadi & Fataruba, 2022). Additionally, this study provides evidence that stereotypes about work capabilities based on gender lack a strong scientific basis, and organizations need to ensure that their policies reflect this equality.

The Influence on Tenure on Performance through Work Fatigue

The research findings indicate that tenure does not have a significant impact on performance through work fatigue, both subjective and objective. This suggest that the length of tenure does not always influence the relationship between fatigue and performance. Individuals with longer tenure may be better at managing their workload, although tolerance for fatigue varies. Ardiansyah & Hasmawaty also found that tenure does not directly affect performance, and other factors such as evaluation systems and compensation have a greater influence on employee motivation and performance (R. Ardiansyah & Hasmawaty, 2021).

The Influence of Nutritional Status on Performance through Work Fatigue

The research findings indicate that nutritional status does not have a significant impact on performance through subjective and objective work fatigue. Although nutritional status is often considered to influence performance, several studies, including one by Shafitra et al, show that this relationship is not always significant (Shafitra, Permatasari, Agustina, & Ery, 2020). This suggests that while nutritional status may affect productivity, other factors may be more dominant in determining employee performance.

The Influence of Workload on Performance through Work Fatigue

Research indicates that mental and physical workload significantly affect performance through subjective fatigue, with physical workload having a greater impact. Mental workload, such as problem-solving, can lead fatigue that decreases performance (Fauziah, Rinawati, & Hastuti, 2021; Peng, Zhou, Zhou, Chu, & Ling, 2021), while physical workload, like lifting and heavy loads, reduce productivity and increases errors (Fan & Smith, 2017). Measures like adequate breaks and ergonomic improvements can help mitigate these affect (Falahati et al., 2019). Nadapdap et al. found that workload affects employee performance through burnout, emphasizing, the need of companies to adjust workloads (Nadapdap, Panjaitan, Damanik, & Simanjuntak, 2024). Jalali et al. noted that while mental workload affects performance through fatigue, its direct impact is not significant (Jalali, Esmaeili, Habibi, Alizadeh, & Karimi, 2023).

The research shows that mental and physical workload do not significantly impact performance through objective fatigue. Physical workload has a more direct effect on performance, as individuals can maintain it despite heavy activity. Ruga et al. also found no significant mediating effect of workload on performance through fatigue, indicating that mental workload does not significantly affect nurses' performance (Ruga, Pamungkas, Kusumapradja, & Kusumapradja, 2022).

The Influence of Work Shift on Performance through Work Fatigue

The research findings indicate that the relationship between work shifts and the performance of AVSEC employees is not significant for both subjective and objective fatigue. Subjective fatigue is not influenced by work shifts, suggesting that AVSEC employees have effective adaptation mechanisms, supported by structured schedules and high motivation to maintain flight security.

Objective fatigue, measured through reaction time, also did not show a significant mediating role. Physical adaptation and good training enable employees to maintain physical and cognitive functions. Additionally, a balance work standard between working hours and breaks, along with strict supervision, helps mitigate the impact of objective fatigue of performance.

CONCLUSION AND RECOMMENDATIONS

The study on Aviation Security employees at Sultan Hasanuddin International Airport in Makassar found that age directly influences performance through work fatigue. Physical and mental workload show an indirect influence on performance. Work fatigue, measured by questionnaires and reaction timers, significantly affects employee performance. AVSEC employee are advised to maintain their physically and mental health by adopting a healthy lifestyle, including regular exercise, nutritious eating, sufficient rest, and fostering good relationship with family and colleagues. For companies is expected to implement sustainable policies to maintain the physical fitness of AVSEC employees, including regular health check-ups, particularly related to fatigue. There should be a proper distribution of job types to reduce the risk of fatigue and performance decline. Additionally, it is recommended to provide rest facilities, organize recreational activities at least once a year to alleviate boredom, and encourage employees to improve their nutritional intake and sleep quality to maintain efficiency at work. For future researchers to expand this study by investigating additional factors that may affect the performance of AVSEC employees. In addition to using questionnaires or

measurement tools, one way to do this is by conducting in-depth interviews to gather broader information.

ABBREVIATIONS:

AMOS: Analysis of Moment Structures; AVSEC: Aviation Security; ICAO: International Civil Aviation Organization; ILO: International Labour Organization; KAUPK2: *Kuesioner Alat Ukur Perasaan Kelelahan Kerja*; NASA-TLX: NASA Task Load Index; NSC: National Safety Council; OHS: Occupational Health and Safety; WHO: World Health Organization.

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