

Associations of Chronotype and Job Stressors with Anxiety, Depression, and Stress among Shift Workers in Oil and Gas Company

Fitria Nurbaeti¹, Feranindhya Agiananda², Levina Chandra Khoe^{3,4}, Dewi Sumaryani Soemarmo^{3,4}, Imron Khazim⁴

¹Occupational Medicine Master Program, Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

²Department of Psychiatry. Cipto Mangunkusumo Hospital- Faculty of Medicine, University of Indonesia, Jakarta, Indonesia

³Department of Community Medicine, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

⁴Occupational and Environmental Health Research Center, Indonesian Medical Education and Research Institute, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

*Corresponding Author: Fitria Nurbaeti

E-mail: Fitria.Betty@gmail.com

Abstract

Background: Oil and gas companies often require employees to work abnormal working hours, namely long shift hours and changing work environment conditions. Understanding how chronotypes, which refer to an individual's biological preferences for choosing sleep and wake times (starting activities) and job stressors impact anxiety, depression, and distress levels among shift workers in oil and gas companies can aid in developing more effective risk management, health, and wellness programs for the workforce.

Objective: This study aims to determine the relationship between chronotype and work stress with anxiety, depression, and stress in oil and gas companies.

Methods: A cross-sectional study was conducted in an oil and gas company in Indonesia. Data was collected in 2024 using online questionnaires and interviews. Chronotype was measured using the Morningness Eveningness Questionnaire (MEQ) in Indonesian Version, job stressors were identified using the Stress Diagnostic Survey (SDS), and distress levels were obtained from the Depression Anxiety Stress Scale 21 (DASS 21).

Results: Based on the results of data analysis, it was found that the chronotype type for workers in oil and gas companies is morning type as much as 57.4% and midnight type as much as 42.6%. From the results of the analysis, no relationship was found between chronotype and work stressors with stress levels. Chronotype type and work stressors are not related to the level of anxiety, depression and stress in the worker population in this study. The level of anxiety, depression, and stress in workers was 20.5% and the prevalence of work stressors in workers experiencing moderate stress levels in the form of role inequality 54.9%, role conflict 52.5%, qualitative overload 52.5%, career development 50%, and responsibility for others 54.1%. While the most quantitative overload stressors were at the mild stress level 54.9%.

Conclusion: The majority of respondents were morning type, and their job stressors were at moderate levels. The chronotype and job stressors did not have relationships with the level of distress. Other factors related to the incidence of anxiety, depression and stress levels in this study were age, length of service and type of work.

Keywords: chronotype, levels of anxiety, depression and stress (distress), shift worker oil and gas, job stressors

Abstrak

Pendabuluan: Perusahaan minyak dan gas sering kali mengharuskan karyawannya untuk bekerja dengan jam kerja yang tidak normal, yaitu jam kerja shift yang panjang dan kondisi lingkungan kerja yang berubab-ubab. Memahami bagaimana kronotipe, yang merujuk pada preferensi biologis seseorang dalam memilih waktu tidur dan bangun (memulai aktivitas) dan pemicu stres pekerjaan memengaruhi tingkat kecemasan, depresi, dan tekanan di antara pekerja shift di perusahaan minyak dan gas dapat membantu dalam mengembangkan program manajemen risiko, kesehatan, dan kesejahteraan yang lebih efektif bagi tenaga kerja.

Tujuan: Penelitian ini bertujuan untuk mengetahui hubungan antara kronotipe dan stres kerja dengan kecemasan, depresi, dan stres pada pekerja shift di perusahaan migas di Indonesia.

Metode: Penelitian ini merupakan penelitian potong lintang yang dilakukan di salah satu perusahaan minyak dan gas di Indonesia. Pengumpulan data dilakukan pada tahun 2024 dengan menggunakan kuesioner dan wawancara daring. Pengukuran kronotipe dilakukan dengan menggunakan Morningness Eveningness Questionnaire (MEQ) dalam Bahasa Indonesia, identifikasi stresor pekerjaan menggunakan Stress Diagnostic Survey (SDS), dan tingkat distress diperoleh dari Depression Anxiety Stress Scale 21 (DASS 21). Analisis data penelitian ini dilakukan dengan metode analisis univariat, bivariat, dan multivariat.

Hasil: Berdasarkan hasil analisis data diperoleh bahwa tipe chronotype untuk pekerja di perusahaan minyak dan gas yaitu tipe pagi sebanyak 57,4% dan tipe tengah-malam sebanyak 42,6%. Dari hasil analisis tidak ditemukan hubungan antara kronotipe dan stresor pekerjaan dengan tingkat stres. Tipe chronotype dan stresor kerja tidak berhubungan dengan tingkat cemas, depresi dan stres pada populasi pekerja di penelitian ini. Tingkat cemas, depresi, dan stres pada pekerja sebanyak 20,5% dan prevalensi stresor kerja pada pekerja mengalami tingkat stres sedang berupa ketaksamaan peran 54,9%, konflik peran 52,5%, beban berlebih kualitatif 52,5%, pengembangan karir 50%, dan tanggungjawab terhadap orang lain 54,1%. Sedangkan stresor beban berlebih kuantitatif terbanyak pada tingkat stres ringan 54,9%.

Kesimpulan: Mayoritas responden bertipe pagi, dan stresor pekerjaan mereka berada pada level sedang. Kronotipe dan stresor pekerjaan tidak memiliki hubungan dengan tingkat stres. Faktor lain yang terkait dengan kejadian kecemasan, depresi, dan tingkat stres dalam penelitian ini adalah usia, lama masa kerja, dan jenis pekerjaan.

Kata kunci: kronotipe, tingkat kecemasan, depresi dan stres (distress), pekerja shift minyak dan gas, stresor kerja

Background

Each individual has a certain chronotype, which is divided into three types: morning, intermediate, and evening. Chronotype refers to an individual's biological preference for choosing bedtime and wake-up time (starting activities). Morning types prefer to wake up and go to bed earlier, while evening types wake up and go to bed later.^{1,2} This chronotype affects how alert or tired a person feels and even determines their most productive time.³ Shift workers, in particular, experience this due to the demands of their jobs, which can cause changes in both work and sleep schedules. Not all workers can adapt to these conditions according to their chronotype. Workers in the oil and gas industry often face changing work shifts, which can disrupt their chronotypes. These shift changes frequently increase work-related stress because the body must constantly adapt to inconsistent schedules.⁴

Oil and gas companies generally have unique characteristics in terms of location, work systems, and work safety risks. Some are located in the middle of the sea (offshore), while others are on land (onshore). Onshore facilities are usually situated in remote forests or mountainous areas, making them difficult to access.⁵ The oil and gas sector involves high risks, substantial costs, and requires highly skilled labor.⁶ To ensure optimal 24-hour operations, oil and gas companies implement shift work and roster systems. However, continuous shift work can lead to sleep disorders.⁷ Sleep disorders occur due to the desynchronization between an individual's chronotype and work schedule, causing workers to experience sleep disturbances and increasing their risk of stress by up to 72.9%. Consequently, this desynchronization is positively correlated with higher rates of anxiety and depression.⁸ Workers in the oil and gas industry are susceptible to stress due to irregular working hours, long night shifts, high workloads, and extreme and changing work environments.⁴ Chronotype influences an individual's response to these conditions, where the mismatch between biological sleep-wake preferences and work schedules can increase the risk of stress, anxiety, and sleep disturbances, especially in individuals with an evening chronotype.⁷

Anxiety and depression are the most common mental disorders worldwide, according to the Global Burden of Disease in 2019.⁹ The prevalence of anxiety ranges from 15% to 41.3%, depression from 4.5% to

32.4%, and stress from 18% to 72.7%.¹⁰⁻¹³ Meanwhile, the prevalence of depression among individuals of productive age (>15 years), based on the 2018 Basic Health Research in Indonesia, reaches 6.1%, or approximately 12 million people.¹⁴ The continuous shift work system in oil and gas companies can lead to sleep disorders,¹⁵ which may negatively impact mental health. The negative consequences of mental health disorders include decreased work productivity¹⁶ and increased healthcare costs.¹⁷

Therefore, this study aims to determine the relationship between chronotype and work stress with anxiety, depression, and stress. This research topic is relatively new in Indonesia, as no studies have yet explored the relationship between chronotype and work stress with these mental health conditions. This study focuses on onshore oil and gas companies because onshore workloads involve significantly more environmental and operational challenges than offshore workloads. The study's findings are presented objectively to avoid bias and accurately reflect the realities of oil and gas companies. Thus, the results of this study can serve as a reference for companies in managing work stress levels among employees, particularly in the oil and gas sector.

Methods

This study employed a cross-sectional observational analytical design based on data collected through an online questionnaire completed by oil and gas shift workers between July and August 2024, with a total sample of 122 respondents. The inclusion criteria were shift workers in the oil and gas industry who were still actively working at the time of the study, aged over 18 years, working for at least one year, and working hours based on shift patterns (morning and midnight). The exclusion criteria included respondents with a history of psychiatric disorders, those who had consumed alcohol in the past year, and those planning to resign or retire during the study period. This study has received approval from the Research Ethics Committee of the Faculty of Medicine, University of Indonesia, with approval number KET.971 / UN2FI / ETIK / PPM.00.02 / 2024.

The Morningness-Eveningness Questionnaire (MEQ) was used to determine chronotype, the Stress Diagnostic Survey (SDS) was used to assess job

stressors, and the Depression Anxiety Stress Scale-21 (DASS-21) was used to measure levels of anxiety, depression, and stress. All instruments in the two questionnaires used in this study have been validated in the Indonesian version and have been used in various countries.^{21,47-49} Additionally, we collected data on respondents' characteristics, including age, type of work, marital status, history of psychiatric illness, and history of chronic diseases (e.g., hypertension, diabetes mellitus, stroke, cardiovascular disease, and cancer). The respondents' work experience was categorized into three groups: less than 5 years, 5–10 years, and more than 10 years. Weekly working hours were classified as either more than 40 hours or less than 40 hours. Data on alcohol consumption and type of work rotation were also collected. Furthermore, this study included interviews as additional data to support the discussion section.

The MEQ has several advantages, including valid and reliable measurement, simplicity and ease of use, comprehensive assessment, and broad applicability.⁵⁰ It consists of 19 questions covering various assessed variables, such as wake-up and sleep times, preferred times for physical activities (e.g., meal times and exercise), mental conditions, and subjective alertness.¹⁸ The interpretation of the questionnaire results is as follows: a score of 41 or below indicates an “evening type”; a score of 59 or above indicates a “morning type”; and a score between 42 and 58 indicates an “intermediate type.”¹⁹

The SDS questionnaire was designed to assess the extent to which various work conditions serve as sources of stress for an individual and how frequently these conditions cause stress.²⁰ The SDS questionnaire is specifically designed to measure stress sources originating from the work environment, not from external factors such as personal life. This is very appropriate for this study which focuses on stress due to working conditions such as night shifts, heavy workloads, or role conflict.²⁰ It consists of 30 questions divided into six categories: role uncertainty, role conflict, excessive workload (both quantitative and qualitative), career development, and responsibility for others, with each category represented by five questions.⁵¹ Each category is assessed on a 7-point scale. The scoring interpretation is as follows: a score of ≤ 9 indicates a mild stress level, a score of 10–24 indicates a moderate stress level, and a score of ≥ 24 indicates a severe stress level.^{20,51}

The DASS-21 questionnaire consists of 21

statements, including seven related to stress, seven related to anxiety, and seven related to depression. The DASS-21 is a shortened version of the DASS-42 scale, which measures an individual's levels of depression, anxiety, and stress. This scale was used as a criterion validity test instrument.²¹ The interpretation of the results is presented as a total score (ranging from 0 to 63) and scores for three subscales (ranging from 0 to 21), categorizing symptoms of depression, anxiety, and stress, each with values ranging from normal to very severe. Once the questionnaire was completed, the data were entered into the database.

Research data from the online questionnaire results were recorded on a computer, verified, coded, and analyzed using IBM SPSS version 25. Normality tests were performed on numerical data using the Kolmogorov-Smirnov test to determine the data distribution. The analysis conducted included: In the univariate analysis, data were analyzed using a frequency distribution table to provide a descriptive overview of all studied variables.

Bivariate analysis was conducted to examine the relationship between independent and dependent variables. Data analysis was performed using the chi-square significance test (if the requirements were met: no cells had a value of 0, and cells with an expected value <5 accounted for no more than 20%) or Fisher's exact test (as an alternative if the chi-square test requirements were not met).

However, recategorization was performed on the outcome categories of several variables, such as anxiety, depression, and stress levels, into two categories: standard and distress. This recategorization was necessary because the analysis could not be conducted using the chi-square or Fisher's exact test. Recategorization was also applied to several other variables, such as chronotype type, work period, and job type, because the bivariate analysis showed an expected count value of <5 in more than 20% of cells (0% and 33.3%). Additionally, using Fisher's exact test yielded no significant results.

The distress category included mild to very severe distress. The chronotype variable was grouped into morning and intermediate-evening types. The job stressor variable was categorized into mild and moderate-severe. The work period variable was divided into >10 years and ≤ 10 years. Lastly, the job type variable was recategorized into jobs with high mobility (mobile) and those without (immobile).^{24,25} High-mobility jobs were defined by the speed of movement and the

changing positions of workers.²⁴ These workers typically move quickly from one location, such as an office desk, to another. The division of job types categorized as immobile (52.5%) included security officers, rig service workers, and others. Meanwhile, the mobile category (47.5%) consisted of operators, assistant operators, and drivers, as their work involves team-based tasks such as inspecting wells in the field—totaling 75 wells every 1 to 2 hours. The strength of the relationship was measured by calculating the Odds Ratio (OR) with a 95% Confidence Interval (CI). A multivariate analysis was then conducted as an additional step to identify independent variables influencing anxiety, depression, and stress levels among company workers. This analysis used a logistic regression test with the Enter method at a 95% significance level. Variables included as candidates in the logistic regression test were those from the chi-square test results with a p-value <0.2.

In this study, to determine the level of job stress, the SDS questionnaire was used, which consists of several variables such as role uncertainty in carried out work duties, what are expected from their jobs at an oil and gas company. Role conflict arises when employees face differences or contradictions in expectations related to their job roles. Quantitative overload occurs when an employee feels overwhelmed by an excessive workload that cannot be completed within the available time. Qualitative overload refers to situations where employees feel burdened not by the quantity of work but by its complexity, difficulty, or the high quality required. Career development encompasses various activities and strategies aimed at helping employees achieve their career goals and enhance their skills and competencies. Responsibility towards others refers to an individual's duty to others, both professionally and personally. Years of service is the duration or number of years an employee has worked at a company or organization. Occupation or job rotation is a management practice in which employees are regularly moved from one task or position to another within the organization.⁵¹

Result

Table 1 presents the characteristics of respondents and risk factor variables that may influence levels of anxiety, depression, and stress. The study involved

122 male participants aged 21 to 59 years, the majority of whom were married (111 respondents, 91%). The highest level of education among respondents was high school/vocational high school, with 103 individuals (84.4%). The four most common job types had a relatively equal number of respondents: rig service (23%), security officers (22.1%), drivers (18.9%), and operators (18%). Meanwhile, the fewest respondents were in the “other” category (7.4%), which included administrative and maintenance roles. A history of chronic disease was reported by only a few respondents (8.2%). All workers in this study were employed under a shift and work rotation system, with the majority (114 respondents, 93.4%) working more than 40 hours per week. Additionally, most respondents had a work tenure of over 10 years, accounting for 53 individuals (43.4%).

The most common chronotype among workers was the morning type, with 70 individuals (57.4%). The majority of work stressors were at a moderate stress level, including role ambiguity (54.9%), role conflict (52.5%), qualitative overload (52.5%), career development (50%), and responsibility for others (54.1%). However, quantitative overload was most frequently reported at a mild stress level (54.9%).

In this study, 20.5% of subjects experienced anxiety, depression, and stress at varying levels, ranging from mild to very severe. This calculation was based on the DASS-21 questionnaire, with the highest proportion of cases classified as very severe (7.4%).

In the bivariate test, job stressor variables including role uncertainty, role conflict, quantitative overload, qualitative overload, career development, and responsibility towards other at moderate to severe levels showed a significant relationship with the incidence of anxiety, depression, and stress ($p < 0.05$) compared to workers with mild stressors. Meanwhile, chronotype demonstrated a statistical relationship with anxiety, depression, and stress but was not consistent across all cases.

The results of the multivariate analysis in this study showed that factors significantly associated ($p < 0.05$) with the levels of anxiety, depression, and stress were age, length of service, and type of work, after being controlled for these variables. Meanwhile, gender, job rotation, length of service, and history of chronic disease, which were analyzed in the bivariate test, did not show any significant relationship ($p > 0.2$) and therefore did not meet the criteria for multivariate testing.

Table 1. Characteristics of respondents

| Variables | Frequency (n=122) | Percentage (%) | Variables | Frequency (n=122) | Percentage (%) |
|---------------------------------|-------------------------------|-------------------|--|----------------------|-------------------|
| Age in years | Median (min-max) 41(21-59) | | Chronotype | | |
| Gender | | | Morning | 70 | 57.4 |
| Male | 122 | 100 | Intermediate | 51 | 41.8 |
| Female | 0 | 0 | Evening | 1 | 0.8 |
| Marital status | | | Job Stressor | | |
| Married | 111 | 91 | Role uncertainty | | |
| Unmarried | 11 | 9 | Mild | 52 | 42.6 |
| Education | | | Moderate | 67 | 54.9 |
| S-I | 19 | 15.6 | Severe | 3 | 2.5 |
| DI/DIII | 0 | 0 | Role conflict | | |
| High school | 103 | 84.4 | Mild | 57 | 46.7 |
| Occupation | | | Moderate | 64 | 52.5 |
| Operator | 22 | 18 | Severe | 1 | 2.5 |
| Operator assistant | 13 | 10.7 | Quantitative overload | | |
| Security | 27 | 22.1 | Mild | 67 | 54.9 |
| Driver | 23 | 18.9 | Moderate | 54 | 44.3 |
| Rig service | 28 | 23 | Severe | 1 | 0.8 |
| Other | 9 | 7.4 | Qualitative overload | | |
| Re-categorization of occupation | | | Mild | 57 | 46.7 |
| Immobile | 64 | 52.5 | Moderate | 64 | 52.5 |
| Mobile | 58 | 47.5 | Severe | 1 | 0.8 |
| History of chronic disease | | | Career development | | |
| Yes | 10 | 8.2 | Mild | 59 | 48.4 |
| No | 112 | 91.8 | Moderate | 61 | 50 |
| Length of work (per week) | | | Severe | 2 | 1.6 |
| ≤ 40 hours | 8 | 6.6 | Responsibility towards others | | |
| > 40 hours | 114 | 93.4 | Mild | 56 | 45.9 |
| Years of service | | | Moderate | 66 | 54.1 |
| > 10 year | 53 | 43.4 | Severe | 0 | 0 |
| 5-10 year | 25 | 20.5 | Levels of anxiety, depression and stress | | |
| < 5 year | 44 | 36.1 | Normal | 97 | 79.5 |
| Work rotation | | | Mild | 7 | 5.7 |
| Yes | 122 | 100 | Moderate | 5 | 4.1 |
| No | 0 | 0 | Severe | 4 | 3.3 |
| | | | Very Severe | 9 | 7.4 |

Table 2. Multivariate analysis of chronotype, job stressors, and other factors with anxiety, depression, and stress level

| Variables | Levels of anxiety, depression and stress | | | | OR (CI 95%) | P | aOR (CI 95%) | aP |
|--------------------------------------|--|-------|-----------|-------|---------------|-------|---------------|-------------|
| | Normal | | Distress | | | | | |
| | N | % | N | % | | | | |
| Chronotype | | | | | 2.4 (0.9-5.9) | 0.049 | 0.8 (0.2-2.7) | 0.89 |
| Morning | 60 | 85.7% | 10 | 14.3% | | | | |
| Intermediate-Evening | 37 | 71.2% | 15 | 28.8% | | | | |
| Age in years | 40(21-59) | | 45(21-55) | | - | 0.167 | | 0.04 |
| Job Stressor | | | | | | | | |
| Role uncertainty | | | | | 5.1(1.6-16.1) | 0.003 | 1.3(0.2-9.6) | 0.8 |
| Mild | 48 | 92.3% | 4 | 7.7% | | | | |
| Moderate-Severe | 49 | 70% | 21 | 30% | | | | |
| Role conflict | | | | | 3.5(1.3-9.6) | 0.011 | 0.6(0.1-4.3) | 0.6 |
| Mild | 51 | 89.5% | 6 | 10.5% | | | | |
| Moderate-Severe | 46 | 70.8% | 19 | 29.2% | | | | |
| Quantitative overload | | | | | 5.4(1.9-14.7) | 0.000 | 4.8(0.8-30) | 0.09 |
| Mild | 61 | 91% | 6 | 9% | | | | |
| Moderate-Severe | 36 | 65.5% | 19 | 34.5% | | | | |
| Qualitative overload | | | | | 4.6(1.6-13.3) | 0.003 | 2.4(0.3-21) | 0.4 |
| Mild | 52 | 91.2% | 5 | 8.8% | | | | |
| Moderate-Severe | 45 | 69.2% | 20 | 30.8% | | | | |
| Career development | | | | | 5(1.7-14.5) | 0.001 | 2.5(0.3-17) | 0.3 |
| Mild | 9 | 81.8% | 2 | 18.2% | | | | |
| Moderate-Severe | 69 | 50.4% | 68 | 49.6% | | | | |
| Responsibility towards others | | | | | 2.6 (1-6.9) | 0.044 | 0.5 (0.5-0.1) | 0.4 |
| Mild | 49 | 87.5% | 7 | 12.5% | | | | |
| Moderate-Severe | 48 | 72.7% | 18 | 27.3% | | | | |
| Years of service | | | | | 2.9(1.1-8.1) | 0.028 | 5.2(1.4-20.1) | 0.02 |
| > 10 year | 47 | 88.7% | 6 | 11.3% | | | | |
| ≤ 10 year | 50 | 72.5% | 19 | 27.5% | | | | |
| Occupation | | | | | 0.6(0.2-1.4) | 0.195 | 0.3(0.1-0.9) | 0.04 |
| Immobile | 48 | 75% | 16 | 25% | | | | |
| Mobile | 49 | 84.5% | 9 | 15.5% | | | | |

Discussion

Our findings showed that most workers have a morning chronotype, with a prevalence of 57.4%, significantly higher than the midnight chronotype. In general, a morning chronotype is associated with higher productivity and alertness at the start of the workday, thereby improving overall work efficiency within the company. This aligns with research conducted by Leichtfried et al,²² which states that morning-type workers tend to have a better mood and higher alertness, contributing to increased work efficiency.

The study also found that there were more immobile workers than mobile workers, however, the results found that the level of distress was higher in immobile workers, even though immobile workers had a greater risk. The research we conducted means that high mobility is associated with higher active transportation while working because these mobile workers moving continuously every hour, and changing locations. The results are similar with research in Korea and Brazil shown that workers with higher mobility are more likely to experience severe depressive symptoms. Although the definition is not exactly the same, it is stated that higher physical activity at work is associated with higher levels of depressive symptoms, while active transportation is associated with lower levels of depressive symptoms.^{24,25}

The inability of workers to adapt to their work environment can lead to depression and stress. This is because workplace and environmental conditions significantly influence mental health.²⁶ According to Nasution et al,²⁷ physical work conditions contribute to work stress by 11.4%. This finding aligns with previous studies, which indicate that variations in work stress can be caused by internal factors, such as personality type and stress resilience as well as external factors, including organizational stressors and job type.²⁸ The National Institute for Occupational Safety and Health (NIOSH) also states that work stress is a harmful physical and emotional response that occurs when job demands exceed workers' abilities, resources, or needs. Excessive work stress can reduce productivity and lead to health issues such as depression, anxiety, high blood pressure, and headaches.²⁹

Additionally, most employees in oil and gas companies are contract workers, with contracts renewed annually sometimes with under different contractors. This creates a risk factor for anxiety, depression, and

stress due to organizational and policy changes.³⁰ Most respondents have the same working hours, namely > 40 hours a week, so to find out whether there is a relationship between length of work and distress levels, further research is needed with a more balanced number of respondents.

This study also found that the years of service is a risk factor for anxiety, depression and stress as much as 3 times in working workers less than 5 and 10 years compared to those whose tenure is > 10 years. This happens because there is already good adaptation to work demands in the form of skills, knowledge and work environment conditions, making it easier for workers to solve problems that may arise in the workplace. Other studies supporting this finding highlight a correlation between employees with shorter tenures are at a higher risk of experiencing depression, anxiety, and stress compared to those who have been working for a longer period.^{31,32} In other cases, role ambiguity among new or recently transferred employees can contribute to stress, as they may not yet have fully adapted to their job roles and primary responsibilities. This lack of clarity regarding job expectations can lead to uncertainty about responsibilities, resulting in job dissatisfaction, reduced self-confidence, feelings of worthlessness, lower self-esteem, depression, and decreased work motivation.^{40,41} This finding is consistent with research conducted on manufacturing company workers in 2014, which reported a p-value < 0.007, indicating that role ambiguity is a moderate work stressor.^{40,41}

The production area of this oil and gas company covers 7,587 m² and contains 77 wells, of which only 49 wells remain active. Working conditions, such as routine inspections that require high mobility, a limited workforce, multiple responsibilities, and overlapping roles, can lead to role conflict and excessive workload both qualitatively and quantitatively. These factors are identified as work stressors in this study. According to research conducted in banking companies, it was found that there was a significant relationship between qualitative excess workload in business units in meeting fundraising targets with credit customers. Workers are required to achieve monthly targets to gain the trust of customers to choose their products by competing with other banking institutions. Meanwhile, quantitative workload occurs when the amount of work that must be completed but the time given is limited, role conflict and work stress also occur in support units related to serving various types of transactions and procedures that

must be carried out so that it can cause inconvenience to customers.^{33,34} Workers may experience both qualitative and quantitative workload stress, which becomes overwhelming if they struggle to adapt to their duties and responsibilities.³⁵ This workload stress condition will have different causes depending on the type of work, work demands and the worker's resilience in adapting and facing problems.

Career development is a personal improvement carried out by someone to achieve a career plan and improvement carried out by the personnel department to achieve a work plan in accordance with the level or level of the organization.³⁷ In this study, limited career development opportunities became an additional stressor for some employees in this study because most respondents were contract employees and their type of work was permanent and there was no job promotion, this could be a stressor if there was no appropriate compensation such as education and training. In line with research on hotel workers in Indonesia, it was stated that career development had a positive and significant effect on job satisfaction $p < 0.000$ and had a negative effect on turnover intention.⁴⁴ While work stress has a positive effect on turnover intention, which means that this career development is protective of job continuity. In line with research on nurses in Australia, it was stated that job dissatisfaction can predict the risk of increasing levels of distress in workers which can ultimately hinder professional performance resulting in a decrease in the quality of care provided.³⁶

The work stressors mentioned above can have both positive and negative effects, depending on an individual's coping mechanisms, ultimately leading to different stress responses in each person. This aligns with the findings of Handayani (2022),¹⁰ which indicate that a high workload increases the incidence of stress, anxiety, and depression threefold compared to a manageable workload. Additionally, a lack of job clarity has been correlated with higher levels of anxiety and stress.¹¹

The role conflict work stressor in this study has a significant relationship ($p < 0.05$) with an increased incidence of anxiety, depression, and stress—3.5 times higher, with the highest prevalence occurring at moderate stress levels. Similarly, research on laboratory workers found that 60% experienced moderate levels of stress.⁴¹ Role conflict typically arises when individuals are assigned tasks that conflict with or do not align with their primary job responsibilities. This situation occurs

in certain roles, such as drivers, who may occasionally assist operators by taking over the duties of assistant operators, or security officers, who sometimes support other personnel in their tasks. However, differences in job types, roles, responsibilities, and work environments between oil and gas workers and laboratory workers may contribute to variations in study results.

This study found a significant relationship ($p < 0.02$) between the length of employment and the occurrence of anxiety, depression, and stress. Workers with less than 5 or 10 years of experience were three times more likely to experience these conditions compared to those who had worked for more than 10 years. This may be due to better adaptation to job demands over time, including the development of skills, knowledge, and familiarity with the work environment, which enables experienced workers to handle workplace challenges more effectively.⁴⁴

This study has potential data bias in the variables related to chronic and mental illnesses since they are self-reported through respondent questionnaires. The lack of access to accurate medical check-up records and the absence of a company doctor prevented the use of medical data as complementary or supporting information. To minimize data bias, this study applies data triangulation by conducting in-depth interviews with several respondents to validate the questionnaire results. Additionally, the confounding variable related to weekly working hours was limited to < 40 hours per week, in accordance with the Regulation of the Minister of Manpower. This working time threshold also applies in China and Japan.^{53,54} While the Asian and European Working Time Directive sets a 48-hour weekly limit, the threshold for when overtime starts or working hours are considered excessive can vary. Many countries use 40 hours as a starting point, with some having specific thresholds within sectors or for certain roles.⁵² However, this threshold may not be ideal for this study due to the job rotation system implemented by the company on all respondents due to the work situation and conditions in the field.

Regarding the research methodology, the cross-sectional design has several limitations. It cannot determine causality, meaning it does not establish whether one variable directly influences another. It cannot capture long-term changes or trends over time. These limitations should be considered when interpreting the findings of this study.

Conclusion

Based on the analysis results, it can be concluded that chronotype and work stressors are not significantly related to anxiety, depression, and stress levels in oil and gas companies. The morning chronotype is the most common among workers (57.4%), and the prevalence of significant work stressors indicates that most workers experience moderate stress levels, with a 20.5% prevalence of anxiety, depression, and stress. Overall, oil and gas workers generally experience mild levels of distress, suggesting that preventive measures can be implemented, such as mental health management programs and health talks to promote well-being.

For future research, studies can be further developed using case-control or cohort analytical designs to better determine the relationship between chronotype and other risk factors associated with anxiety, depression, and stress in workers. Additionally, future research can be conducted on different populations with more varied characteristics, such as gender, length of work rotation, obesity, and other potential factors that may influence the occurrence of anxiety, depression, and stress.

References

1. Kivelä L, Papadopoulou MR, Antypa N. Chronotype and psychiatric disorders. *Current Sleep Medicine Reports* 2018;4:94-103.
2. Adan A. A chronobiological approach to addiction. *J Substance Use* 2013;18:171-83.
3. Randler C, Schredl M, Göritz AS. Chronotype, sleep behavior, and the big five personality factors. *Sage Open* 2017;7:2158244017728321.
4. Rosa DE, Marot LP, de Mello MT, Marqueze EC, Narciso FV, de Araújo LB, Crispim CA. Association between chronotype and psychomotor performance of rotating shift workers. *Scientific Reports* 2021;11:6919.
5. Wagner M, Wagner M, Piske J, Smit R. Case histories of microbial prospecting for oil and gas, onshore and offshore in northwest Europe. *AAPG studies in Geology* 2002;48:453-79.
6. Miesner TO, Leffler WL. *Oil and gas pipelines in nontechnical language*. PennWell Books, LLC; 2020.
7. Flo E, Pallesen S, Åkerstedt T, Magerøy N, Moen BE, Grønli J, Nordhus IH, Bjorvatn B. Shift-related sleep problems vary according to work schedule. *Occup Env Med* 2013;70:238-45.
8. Alwhaibi M, Al Aloola NA. Associations between stress, anxiety, depression and sleep quality among healthcare students. *J Clin Med* 2023;12:4340.
9. Yang X, Fang Y, Chen H, Zhang T, Yin X, Man J, Yang L, Lu M. Global, regional and national burden of anxiety disorders from 1990 to 2019: results from the Global Burden of Disease Study 2019. *Epidemiol Psychiatr Sci* 2021;30:e36:1-11.
10. Handayani P. Stres kerja pada pekerja ditinjau dari beban kerja di unit produksi PT X. *JCA Health Sci* 2022;2:49-52.
11. Palaniappan K, Natarajan R, Dasgupta C. Prevalence and risk factors for depression, anxiety and stress among foreign construction workers in Singapore—a cross-sectional study. *Int J Construct Manag* 2023;23:2479-87.
12. Rao S, Ramesh N. Depression, anxiety and stress levels in industrial workers: A pilot study in Bangalore, India. *Industrial Psychiatr J* 2015;24:23-28.
13. Maharaj S, Lees T, Lal S. Prevalence and risk factors of depression, anxiety, and stress in a cohort of Australian nurses. *Int J Env Res Public Health* 2019;16:61.
14. Riskesdas. Hasil Utama Riskesdas. Kemenkes RI. Diambil kembali dari https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf. (Accessed on February 10, 2024)
15. Freeman D, Sheaves B, Waite F, Harvey AG, Harrison PJ. Sleep disturbance and psychiatric disorders. *The Lancet Psychiatr* 2020;7:628-37.
16. Hennekam S, Richard S, Grima F. Coping with mental health conditions at work and its impact on self-perceived job performance. *Employee Relations: The International Journal* 2020;42:626-45.
17. Alfian SD. Riset di Bandung: Biaya pengobatan untuk masalah kesehatan jiwa di Indonesia Rp 87 triliun setahun. 10 A2021
18. Kaur V. Assessing the impact of work schedules on sleep, activity, energy balance, and food choice in adults. SWEAT Study (Sleep Work, Energy intake, AcTivity) (Doctoral dissertation, Memorial University of Newfoundland); 2024.
19. Cheng WJ, Puttonen S, Vanttola P, Koskinen A, Kivimäki M, Härmä M. Association of shift work with mood disorders and sleep problems according to chronotype: a 17-year cohort study. *Chronobiol Int* 2021;38:518-25.
20. Pfejfer-Buczek A, Nowicka J, Ciekanski Z, Marciniak S. Stress in the working environment and its causes. *Eur Res Studies J* 2023;26:138-51.
21. Hakim MA, Aristawati NV. Mengukur depresi, kecemasan, dan stres pada kelompok dewasa awal di Indonesia: Uji validitas dan reliabilitas konstruk DASS-21. *Jurnal Psikologi Ulayat* 2023;10:232-50.
22. Leichtfried V, Mair-Raggautz M, Schaeffer V, Hammerer-Lercher A, Mair G, Bartenbach C, Canazei M, Schobersberger W. Intense illumination in the morning hours improved mood and alertness but not mental performance. *Applied ergonomics* 2015;46:54-9.
23. Mascalco L, Schouteden M, Boon J, Vandebroek S, Mehlum IS, Godderis L, Matranga D. The long-term effect of job mobility on workers' mental health: a propensity score analysis. *BMC Public Health* 2022;22:1145.
24. Ryu J, Jeong A, Min JH, Lee DH, Lee J, Song IH, Jeon JY. The relationship between domain-specific physical activity and depressive symptoms in Korean adults: Analysis of the Korea National Health and Nutrition Examination Survey. *J Affect*

- Dis 2022;302:428-34.
25. Oliveira AJ, Pancoti BM, Oliveira BR, de Figueiredo JA, Paravidino V. Associations of occupational physical activity and active transport with depressive symptoms in a middle-income country. *Public Health* 2024;232:195-200.
 26. Adhikari B, Poudel L, Bhandari N, Adhikari N, Shrestha B, Poudel B, Bishwokarma A, Kuikel BS, Timalsena D, Paneru B, Gurung M. Prevalence and factors associated with depression, anxiety and stress symptoms among construction workers in Nepal. *Plos one* 2023;18:e0284696.
 27. Suliswati T, Jeremia A, Yenny M, Sumijatun S. Konsep dasar keperawatan kesehatan jiwa. Jakarta: EGC; 2005.
 28. Nasution HH, Novliadi F, Bangun MK. Analisa stress kerja pada kondisi dan beban kerja perawat dalam klasifikasi pasien di ruang rawat inap Rumkit TK II Putri Hijau KESDAM I/BB Medan (Doctoral dissertation, Universitas Sumatera Utara), 2007.
 29. Riggio RE. Introduction to industrial/organizational psychology (6th ed.). New Jersey: Pearson Education; 2013.
 30. Lundberg U, Cooper C. The science of occupational health: Stress, psychobiology, and the new world of work. John Wiley & Sons; 2010.
 31. Mukerjee J, Montani F, Vandenberghe C. A dual model of coping with and commitment to organizational change: the role of appraisals and resources. *J Org Change Manag* 2021 ;34:1144-61.
 32. Virtanen M, Ferrie JE, Singh-Manoux A, Shipley MJ, Stansfeld SA, Marmot MG, Ahola K, Vahtera J, Kivimäki M. Long working hours and symptoms of anxiety and depression: a 5-year follow-up of the Whitehall II study. *Psychol Med* 2011;41:2485-94.
 33. Wirawan A, Halimah S, Fajrin A. Penilaian tingkat depresi, kecemasan, dan stres pada karyawan bank XYZ dengan menggunakan metode DASS-42 Test. *Jurnal Bisnis Mahasiswa* 2023;3:29-39.
 34. Alias NS. Determinants of job stress in affecting employees' life: a study on the Malaysian manufacturing sector 2021;9:1212-25.
 35. Rehman A, Pacheco D. Chronotypes: definition, types, & effect on sleep. Accessed on 8 September 2023. Available from: <https://www.sleepfoundation.org/how-sleep-works/chronotypes> (Accessed on February 01, 2024)
 36. Maharaj S, Less T, Lal S. Prevalence and risk factors of depression, anxiety and stress in a cohort of Australian nurses. *Int J Environ Res Public Health* 2018;27;16:61. Doi: 10.3390/ijerph16010061
 37. Mufidah A. Hubungan antara konflik peran ganda dan pengembangan karir dengan stres kerja pada karyawan bank Lampung yang sudah menikah (Doctoral dissertation, UIN Raden Intan Lampung), 2020.
 38. Rattrin AF, Wilson W. Hubungan antara chronotype dengan tingkat gejala depresi pada mahasiswa kedokteran tingkat pertama di Fakultas Kedokteran Universitas Tanjungpura. *Jurnal Cerebellum* 2020;6:66-71.
 39. Kalfin, Yuningsih SH, Prabowo A. Significant positive impact of regular exercise on mental and physical health. *Int J Health Med Sports* 2024;2:89-93.
 40. Saalwirth C, Leipold B. Sleep and chronotype in relation to work-related stress and negative affect: The moderating role of a flexible start of work. *Somnologie* 2021;25:119-25.
 41. Adytra L, Ramdhan DH. Faktor-faktor yang berhubungan dengan kelelahan kerja di PT X di Jabodetabek. *Jurnal Cahaya Mandalika* 2023;3:720-7.
 42. Syahidan GJ, Ishak NI, Fauzan A. Hubungan ketaksaan dan konflik peran dengan stres pada tenaga kerja di laboratorium K3 Provinsi Kalimantan Selatan. *An-Nadaa: Jurnal Kesehatan Masyarakat (e-Journal)*. 2022;9:22-8.
 43. Alias NE, Sehat NS, Othman R, Marmaya NH, Koe WL. Determinants of job stress in affecting employees' life: A study on the Malaysian manufacturing sector. *Int J Acad Res Business Social Sci* 2019;9:614-27.
 44. Yumna AB. Pengaruh Pengembangan Karir Dan Stres Kerja Terhadap Turnover Intention Melalui Kepuasan Kerjasebagai Variabel Intervening di Hotel Grand Inna Malioboro Yogyakarta. Universitas Islam Indonesia (Skripsi), 2022.
 45. Mariska I, Sosrosuhardjo D, Moestopo WI, Basuki B. Purser support and the tendency of depression among civil female flight attendants in Indonesia. *Health Sci J Indonesia* 2015;6:76-80.
 46. Taylor K, Hampson E, Soneji U. At a tipping point? Workplace mental health and wellbeing. Deloitte Center for Health Solutions, 2017.
 47. Cazellina NS. Faktor-faktor yang berhubungan dengan obesitas sentral pada petugas keamanan dan kebersihan UIN Syarif Hidayatullah Jakarta Tahun 2020 (Bachelor's thesis, UIN Syarif Hidayatullah Jakarta-FIKES), 2021.
 48. Terman M, Rifkin JB, Jacobs J, White TM. "Morningness-Eveningness Questionnaire Self-Assessment Version (MEQ-SA)." Columbia University Irving Medical Center, New York City.
 49. Firmansyah, Richard. Uji validitas dan reliabilitas *Morningness-Eveningness Questionnaire* (MEQ) Versi Bahasa Indonesia sebagai Alat Penentu *Chronotype* pada Pekerja. 2021.
 50. Azzahra A, Trinastiti C, Rosaline HS. Keterkaitan antara kesehatan mental dengan tenaga kerja [Journal]. - [s.l.]: ResearchGate, 2022.
 51. Maududi AAA, Ani N, Ayudia S, Semedhi BP. Uji validitas dan reliabilitas survei diagnosis stress kerja. 2024;8:144-53.
 52. SHRM. EU Countries apply working hour directive similarly. UK.2024. Available from: <https://www.shrm.org/topics-tools/employment-law-compliance/eu-countries-apply-working-hour-directive-similarly> (Accessed on February 21, 2024)
 53. Zhou, Dream. Working Hours in China. MSA. 2024. Available from: <https://msadvisory.com/working-hours-china/> (Accessed on October 01, 2024)
 54. Aleksandra. Standard working hours in Asia. Vacation Tracker. 2019. Available from: <https://vacationtracker.io/blog/standard-working-hours-in-asia/> (Accessed on October 10, 2024)