Impact Factor:					
	ISRA (India) = 6.317	SIS (USA) = 0.912	ICV (Poland) = 6.630
	ISI (Dubai, UAE) = 1.582	РИНЦ (Russia) = 3.939	PIF (India) = 1.940
	GIF (Australia) = 0.564	ESJI (KZ) = 8.771	IBI (India) = 4.260
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Issue Article

Rio J. M. Marpaung
University of Riau
Jl. Binawidya Km 12.5, 28291,
Pekanbaru Riau, Indonesia
Faculty of Economics and Business

MEASUREMENT OF NURSES' PHYSICAL AND MENTAL WORK LOAD ON WORK STRESS LEVEL AND PERFORMANCE IN DUMAI CITY HOSPITAL

Abstract: *This research was purposed to find out the analysis of nurses' physical and mental work loads on work stress and performance in Dumai City Hospital. The population were 391 nurses and the sample were 80 nurses. The data used in this study is primary data and the analysis tool used in this study is path analysis with nurses' performance as the dependent variable, work stress as the intervening variable, and two independent variables are physical work loads and mental work loads. The result of the study found shows that: 1) Physical work loads give significant effect on the work stress 2) Mental work loads give significant effect on the work stress 3) Physical work loads give significant effect on the performance. 4) Mental work loads give significant effect on the performance. 5) Work stress gives significant effect on the performance. 6) Physical work loads give significant effect on the performance through work stress. 7) Mental work loads give significant effect on the performance through work stress.*

Key words: *Physical Work Loads, Mental Work Loads, Work Stress, Performance.*

Language: *English*

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Introduction

The world is currently experience an outbreak of a virus called coronavirus disease 2019 (COVID-19) which was caused by severe acute syndrome coronavirus-2 (SARS-CoV-2). Coronavirus is a virus that attacks the respiratory system. The corona virus can cause minor disorders of the respiratory system, and severe lung infections, even death. This virus can be transmitted from human to human and has spread widely which initially occurred in China, and now more than 190 countries including Indonesia is struggling to resolve. The spread of this disease has given broad social and economic impacts.

Severe acute respiratory syndrome coronavirus 2 (SARSCoV- 2), better known as the Coronavirus, is a new type of corona virus that is transmitted to humans. This virus can affect anyone, including infants, children, adults, the elderly, pregnant women, and breastfeeding mothers. Coronavirus is a collection of viruses that can infect the respiratory system. In many cases, this virus only causes mild respiratory infections, such as flu. However, this virus can also cause severe respiratory infections, such as lung infections (pneumonia).

The issue of manpower is one of the most common problems that developing countries must face and resolve, especially in Indonesia. Manpower is one of the most important sectors in an effort to advance national development because it is related to the welfare of the community. According to Suroto and Tindaon (2010), labor / manpower is a driving force in development, which acts as a resource to carry out the process of production and distribution of goods or services, as well as a target to revive and develop markets.

In the context of ergonomics, every workload received by a person must be balanced both against physical abilities, cognitive abilities and human

limitations who accept the burden. The goal to be achieved is to ensure that the work system is designed in such a way as to obtain the best productivity and work quality, which can be achieved if the load is within the limits of physical ability.

In carrying out work activities, humans experience a physical and mental workload in which when it is done continuously, it will cause fatigue and work stress besides it will have an impact on performance. Tika (2006) stated that performance is the results of the work function / activity of a person or group in an organization which is influenced by various factors to achieve organizational goals within a certain time period.

The work done by workers can give its own burdens to themselves, in terms of physical, mental and social. Employees' performance appraisal is one way to optimize employees' work results so that they can carry out their duties and responsibilities better.

This study was conducted at the Dumai City Hospital because this hospital can be accessed by the people living in Dumai City who want come for a treatment for the diseases they suffer from. This, of course, has made the nurses working in this hopital is facing various conditions. They are required to work in accordance with the standards set by the hospital and provide satisfaction for patients, while on the other hand they have needs and desires that need attention from the relevant agencies. This condition will certainly cause work stress and can also affect the decline in nurses' performance.

The increasing workload experienced by nurses due to the demands of professionalism implicate the nurses in the emergence of psychological pressures in the form of job stress caused by workloads and working conditions (Anil JC, 2010).

Literature Review

Performance

Performance is sometimes be interpreted as the result of work or work performance. Performance is about doing the job and the results it achieves. Performance is the result or level of success of a person as a whole during a certain period in carrying out a task compared to various possibilities, such as work standards, targets or criteria that have been determined in advance that have been mutually agreed upon (Rivai and Basri, 2005).

Performance indicators, are:

a. Interpersonal Communication
b. Ethics and Etiquette
c. Good Nursing Care
d. Organizing Work
e. Knowledge

Work Stress

Work stress is all stimulations or actions from the human body, both from outside and inside the body itself which can cause various adverse effects ranging from decreased health to suffering from a disease (Manuaba, 1998 in Tarwaka 2015: 374).

Work stress indicators are:

a. Psychological reaction
b. Social response
c. Individual response
d. Emotional response
e. Physiological change
f. Work performance
g. Employee morale (Tarwaka, 2015)

Physical Workload

Physical Workload is work that requires physical energy in human muscles which functions as a source of energy. Physical work is also called 'manual operation' where work performance will fully depend on human efforts which act as a source of energy and work controllers (Tarwaka, 2015: 107)

Physical workload indicators are:

a. Respiratory
b. Feelings of restlessness
c. Body condition
d. Difficulty to control attitudes (Tarwaka, 2015)

Mental Workload

Mental Workload is a workload which becomes a gap between the workload demands of a task and the maximum capacity of a person's mental load in a motivated condition (Jex, 1988 in Tarwaka 2013)

Mental workload indicators are:

a. Attention load (attention)
b. Work ability
c. Task load
d. Physical load
e. Psychic load
f. Emotional load

Research Method

The population of this study were all nurses in Dumai City Hospital, amounting to 391 people. The number of samples was determined as many as 80 nurses. The methods used in data collection are observation, questionnaire and interview. The data analysis used in this research is Path Analysis by using the SPSS version 24 application.

Result and Discussion

Research Result

Validity and Reliability Testing

Validity Testing

The value of r table at a significant level of 5% alpha is equal to df = N-2, df = 80-2, df = 78 and α = 0.05, the r table value is 0.219. The following is the validity test table:

Table 1. Validity Testing

Variable	Item	r value	r table	Judgment
Performance (Y2)	Y2_1	0.757	0.219	Valid
	Y2_2	0.687	0.219	Valid
	Y2_3	0.635	0.219	Valid
	Y2_4	0.741	0.219	Valid
	Y2_5	0.646	0.219	Valid
Work Stress (Y1)	Y1_1	0.359	0.219	Valid
	Y1_2	0.584	0.219	Valid
	Y1_3	0.723	0.219	Valid
	Y1_4	0.662	0.219	Valid
	Y1_5	0.607	0.219	Valid
	Y1_6	0.589	0.219	Valid
	Y1_7	0.710	0.219	Valid
Physical Workload (X1)	X1_1	0.809	0.219	Valid
	X1_2	0.839	0.219	Valid
	X1_3	0.869	0.219	Valid
	X1_4	0.724	0.219	Valid
Mental Workload (X2)	X2_1	0.811	0.219	Valid
	X2_2	0.823	0.219	Valid
	X2_3	0.871	0.219	Valid
	X2_4	0.789	0.219	Valid
	X2_5	0.796	0.219	Valid

Source:Processed Data, 2019

Based on Table 1, it can be seen that each statement item is valid. It is because the calculated r value is greater than the r table. So, this means that the data is valid.

Reliability Testing

Reliability can be calculated with the Alpha Cronbach. A variable is considered reliable if the Cronbach alpha value is above 0.60. The results of reliability testing can be seen in Table 2 below:

Table 2. Reliability Testing

Variable	Cronbach's Alpha	Score Critical	Judgment
Performance (Y2)	0.730	0.60	Reliable
Work Stress (Y2)	0.717	0.60	Reliable
Physical Workload (X1)	0.827	0.60	Reliable
Mental Workload (X2)	0.877	0.60	Reliable

Source : Processed Data, 2019

Based on Table 2, it shows that the Cronbach alpha coefficient value of all variables (x and y variables) is > 0.60. Then all variable statements are reliable.

Classic Assumption Test

Normality Testing

Here is the result of Normality Testing

Table 3. Normality Testing Data Structure 1

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		80
Normal Parametersa,b	Mean	,0000000
	Std. Deviation	3.01983296

Most Extreme Differences	Absolute	,091
	Positive	,052
	Negative	-,091
Test Statistic		,091
Asymp. Sig. (2-tailed)		,095c
a. Test distribution is Normal.		
b. Calculated from data.		
c Lilliefors Significance Correction.		

Source:Processed Data, 2019

Table 4. Normality Testing Data Structure 2

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		80
Normal Parametersa,b	Mean	,0000000
	Std. Deviation	1.83791915
Most Extreme Differences	Absolute	,085
	Positive	,043
	Negative	-,085
Test Statistic		,085
Asymp. Sig. (2-tailed)		,200c,d
a. Test distribution is Normal.		
b. Calculated from data.		
c Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

Source : Processed Data, 2019

Based on the results of the normality test presented above, it can be seen that the significance value of each variable is greater than α = 0.05. Thus, it can be concluded that all variables in this study are normally distributed.

Multicollinearity Test

Here is the result of Multicollinearity Test

Table 5. Multicollinearity Testing Data Structure 1

Coefficientsa						
		Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
Model		B	Std. Error	Beta	Tolerance	VIF
1	(Constant)	16.309	1.464			
	Physical Workload	,282	,115	,262	,654	1.528
	Mental Workload	,403	,093	,462	,654	1.528
a. Dependent Variable: Work Stress						

Source : Processed Data, 2019

Table 6. Multicollinearity Testing Data Structure 2

Coefficientsa						
		Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
Model		B	Std. Error	Beta	Tolerance	VIF
1	(Constant)	27.625	1.449			
	Physical Workload	-,250	,073	-,315	,607	1.648
	Mental Workload	-,226	,064	-,351	,527	1.899
	Work Stress	-,186	,070	-,252	,576	1.738
a. Dependent Variable: Performance						

Source : Processed Data, 2019

From Tables 3 and 4, it can be seen that the VIF value is <10 for all independent variables, as well as the tolerance value that is > 0.10. Thus, it can be concluded that there is no multicollinearity between the independent variables in this study.

Heteroscedasticity Test

The following is a graphic for the result of the heteroscedasticity test

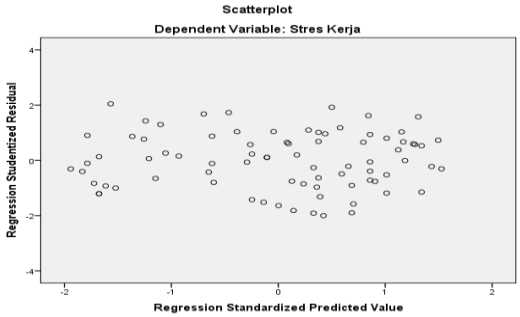

Figure 1. Heteroscedasticity Test of Structure 1

Source : Processed Data, 2019

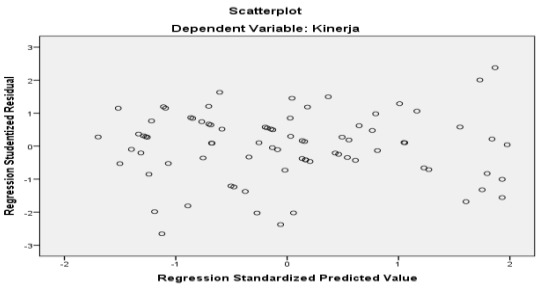

Figure 2. Heteroscedasticity Test of Structure 2

Source : Processed Data, 2019

From the Scatterplot above, it can be seen that the data spreads randomly above and below point 0 on the Y axis, so there is no heteroscedasticity.

Structural Test Results

F Test

The F test is used to determine the joint effect of the independent variables on the dependent variable (Ghozali, 2013). If Fvalue>Ftable then Ha is accepted or collectively the independent variable can explain the dependent variable together.

Table 7. F Test of Data Structure 1

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	531.368	2	265.684	28.396	,000b
	Residual	720.432	77	9.356		
	Total	1251.800	79			
a. Dependent Variable: Work Stress						
b. Predictors: (Constant), Beban Kerja Mental, Beban KerjaFisik						

Source : Processed Data, 2019

From Table 5 it is known that F_{Hitung} is 449.606 with a significance of 0.000. The F table can be obtained as follows:

F table $= n - k - 1; k$

$= 80-2-1; 2$

$= 77 ; 2$

$= 3{,}12$

Note

n : total sample

k : number of independent variables

1 : constant

Therefore the F value (28,396) > F table (3,12) with Sig. (0,000) < 0,05. This means that the variables of physical workload and mental workload together have a significant effect on work stress.

Table 8. F Test of Data Structure 2

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	416.130	3	138.710	39.504	,000b
	Residual	266.858	76	3.511		
	Total	682.988	79			
a. Dependent Variable: Performance						
b. Predictors: (Constant), Work Stress, Physical Workload, Mental Workload						

Source : Processed Data, 2019

From Table 5 it is known that F_{Hitung} is 449.606 with a significance of 0.000. The F table can be obtained as follows:

F table $= n - k - 1; k$
$=$ 80-3-1 ; 3
$=$ 76 ; 3
$=$ 2,72

Note
n : total sample
k : number of independent variables
1 : constant

Therefore the F value (39,504) > F table (2,72) with Sig. (0,000) < 0,05. This means that the variables of physical workload, mental workload and work stress have a significant effect on work stress.

t Test

The T test is used to test the independent variable towards the dependent variable partially (individually) (Ghozali, 2013). If the indicator is $t_{Hitung} > t_{tabel}$ or significance (r) $<$ 0,05 and Sig. F $<$ α 0,005, so H0 is rejected or the independent variable simultaneously has a significant effect on the dependent variable.

Table 9. t Test of Data Structure 1

Coefficientsa						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	16.309	1.464		11.139	,000
	Physical Workload	,282	,115	,262	2.456	,016
	Mental Workload	,403	,093	,462	4.319	,000
a. Dependent Variable: Work Stress						

Source : Processed Data, 2019

It resulted on the t table at the 5% significance level (2-tailed) with the following equation:

t table $= n - k - 1; \alpha/2$
$=$ 80 – 2 – 1 ; 0,05/2
$=$77 ;0,025
$=$1,991

Note
n : total sample
k : number of independent variables
1 : constant

Therefore the it is found that:

Physical workload resulted in tvalue (2,456) >ttable (1,991) or significance (0,016) < 0,05. This means that physical workload affects work stress.

Mental workload resulted in tvalue(4,319) >ttable(1,991) or significance (0,000) < 0,05. This means that mental workload affects work stress.

From table 9 above, the equation of structural 1 is obtained as follows:

Y1 = ρy1x1X1 + ρy1x2X2 + ρy1ε1
Y1 = 0,262X1 + 0,462X2 + 0,759ε1

The meaning of the structural equation above is:

The coefficient value of the physical workload variable obtained is 0.262. This means that each increase in physical workload by 1 unit will increase work stress by 0.262 and vice versa, assuming other variables remain the same.

The coefficient value of mental workload variable is 0.462. This means that 1 unit of each mental workload will increase work stress by 0.462 and vice versa, assuming other variables remain the same.

Standard error (ε1) is 0.759. This means that the error path coefficient for other variables outside the study that affects work stress as much as 0.759.

Table 10. t Test of Data Structure 2

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	27.625	1.449		19.059	,000
	Physical Workload	-,250	,073	-,315	-3.417	,001
	Mental Workload	-,226	,064	-,351	-3.551	,001
	Work Stress	-,186	,070	-,252	-2.671	,009
a. Dependent Variable: Performance						

Source : Processed Data, 2019

It resulted on the t table at the 5% significance level (2-tailed) with the following equation:

t table $= n - k - 1; \alpha/2$

$= 80 - 3 - 1 ; 0,05/2$

$=76 ; 0,025$

$=1,992$

Note

n : total sample

k : number of independent variables

1 : constant

Therefore the it is found that:

Physical workload resulted in t value (3,417) > t table (1,992) or significance (0,001) < 0,05. This means that physical workload affects performance.

Mental workload resulted in t value(3,551) > t table(1,992) or significance (0,001) < 0,05. This means that mental workload affects performance.

Working discipline resulted in t value (2,671) > t table (1,983) or significance (0,009) < 0,05. This means that work stress affects performance.

Y2 =ρy2x1X1 + ρy2x2 X2+ρy2y1Y1 + ρy2ε2

Y2 = 0,315X1 + 0,351X2 + 0,252Y1 + 0,625ε2

The meaning of the structural equation above is:

The coefficient value of the physical workload variable obtained is 0.315. This means that each increase in physical workload by 1 unit will increase performance by 0.315 and vice versa, assuming other variables remain the same.

The coefficient value of mental workload variable is 0.351. This means that each increase in mental workload by 1 unit will increase performance by 0.351 and vice versa, assuming other variables remain the same.

The coefficient value of mental work stress variable is 0.252. This means that each increase in work stress by 1 unit will increase performance by 0.252 and vice versa, assuming other variables remain the same.

Standard error (ε2) is 0.625. This means that the error path coefficient for other variables outside the study that affects performance as much as 0.625.

Coefficient of Determination (R2)

R value or R2 can be seen in this following table:

Table 11. Coefficient of Determination Test Results of Structure 1

Model Summaryb				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,652a	,424	,410	3.059
a. Predictors: (Constant), Mental Workload, Physical Workload				
b. Dependent Variable: Work Stress				

Source : Data Processing, 2019

The calculation of the coefficient of determination (KD) was done using the following formula:

KD = R Square ×100%

KD = 0,424 × 100%

KD = 42,4%

This means that the effect of physical workload and mental workload on work stress simultaneously is 42.4%, while the remaining 57.6% can be influenced by other variables not included in this model.

Table 12. Coefficient of Determination Test Results of Structure 2

Model Summaryb				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,781a	,609	,594	1.874
a. Predictors: (Constant), Work Stress, Physical Workload, Mental Workload				
b. Dependent Variable: Performance				

Source : Data Processing, 2019

R Square = 0.609 This is used to see how much the influence obtained by the coefficient of determination of path 2 of 0.609. This means that the effect of physical workload, mental workload and work stress towards work stress is 60.9%, while the remaining 39.1% is influenced by other variables that are not included in this model.

Path Analysis

Based on the processed data, it can be calculated that the relationship between the direct and indirect impact of physical workload and mental workload variables on performance through work stress can be seen in the table below:

Table 13. Summary of Model Parameter Estimates

Impact	Relation		Total	Note
	Direct	Indirect		
Physical workload → Work stress	0.262	-	0.262	Moderate
Mental workload → Work stress	0.462	-	0.462	Strong
Physical workloads → Performance	0.315	0,262 x 0,252 = 0,066	0.381	Strong
Mental workloads → Performance	0.351	0,462 x 0,252 = 0,116	0.467	Strong
Work stress → Performance	0.252	-	0.252	Moderate

Source: Processed Data, 2019

From the result, a figure of structural model of the study can be drawn as follows:

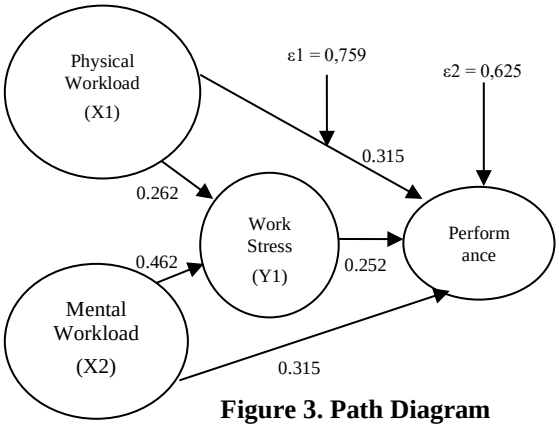

Figure 3. Path Diagram

Source: Processed Data, 2019

$$\varepsilon 1 = \sqrt{1} - R^2 = \sqrt{1} - 0{,}424 = 0{,}759$$
$$\varepsilon 2 = \sqrt{1} - R^2 = \sqrt{1} - 0{,}609 = 0{,}625$$

Discussion

The Effect of Physical workload towards Work stress

Based on the research that has been done, it is known that the physical workload variable gives a positive and significant effect on work stress. This is because excessive workload on nurses can lead to work stress. Nurses who experience work stress allow them to be unable to perform effectively and efficiently because their physical and cognitive abilities are reduced.

The Effect of Mental Workload towards Work stress

Based on the research that has been done, it is known that the mental workload variable gives a positive and significant effect on work stress. This is because mental workload can emerge from an increase in the number of patients along with an increase in the demands of nurses' duties in the form of mental workloads. The increasing workload experienced by nurses due to the demands of professionalism implicate the nurses in the emergence of psychological pressures in the form of work stress caused by mental workloads.

The Effect of Physical workload towards Performance

Based on the research that has been done, it is known that the physical workload variable gives a positive and significant effect on performance. This is because workload is an individual extrinsic factor which becomes one of the sources of performance problems, because the workload a person is facing is too high. This condition requires nurses to provide more energy than usual in completing their work, not all nurses have the same level of resistance to pressure from the workload, but all of this depends on each individual. It means that whether these tasks will be completed properly or not depends on how one thinks the workload he experiences.

The Effect of Mental Workload towards Performance

Based on the research that has been done, it is known that the mental workload variable gives a positive and significant effect on performance. This is because when the mental workload continues to increase, the nurse's performance will decrease. Mental workload is an element that must be considered by a workforce to make a harmony and high work productivity.

The Effect of Work Stress towards Performance

Based on the research that has been done, it is known that the work stress variable gives a positive and significant effect on performance. This is because nurses who experience stress will have difficulty concentrating on work. The poor performance of nurses is influenced by various factors, one of which affects the performance of nurses is work stress experienced by nurses. High level of work stress can reduce the quality of nursing care. The decline in the quality of nursing care occurs because the work system is not supportive and the workload is too heavy, which then cause work stress.

The Effect of Physical workload through Work stress

Based on the research that has been done, it is known that the physical workload variable gives a positive and significant effect on work stress. This is because inappropriate physical workload will make nurses to experience work stress and this condition is eventually carried away at work, thereby reducing the quality of the nurse's work.

The Effect of Mental Workload through Work stress

Based on the research that has been done, it is known that the mental workload variable gives a positive and significant effect on work stress. This is because the mental workload will cause work stress which in turn gives an impact on reducing the performance of nurses. The mental workload of hospital nurses can be in the form of the presence of various types of patients and illnesses, time pressure in making fast and correct decisions to take action on patients and having to face panicked patient families.

Conclusions And Suggestions

Conclusions

Based on the descriptive results, it can be seen that the performance of nurses is not yet good, especially in the indicators of providing health education about how to care for patients to the patient's family.

Job stress gives significant effects on performance. The lowest value is found on the indicators of experiencing emotional changes (unstable emotions).

Physical workload gives significant effects on performance. The lowest value is on the indicator of breathing and a faster heart rate while working.

Mental workload gives significant effects on performance. The lowest score is the indicator of often feeling frustrated when doing work during working hours.

Suggestions

The hospital is expected to be able to educate nurses on how to provide clear information to the patient's family.

The hospital is expected to provide emotional control training for nurses.

Nurses are expected to be able to take rest first when their breathing and heart rate are faster while working and the hospital is expected to not place too much burden on nurses beyond the their capacity.

In order to create good mental health, the hospital can provide comfort by creating a comfortable work space for nurses.

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