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Identification of Social Support and Knowledge of Covid-19 Survivors with Structural Equation Modeling in R*

Nur Silviyah Rahmi[1], Laila Masruro Pimada[2‡], Reza Yesica[3], Devi Nur Cahaya Ningsih[4]

[1,2,3,4]Department of Statistics, Brawijaya University, Indonesia
‡corresponding author: silviyahrahmi@ub.ac.id

Abstract

COVID-19 cases in Indonesia have finally reached a second peak amounting to 4 million cases. A number of the death rate was 3.4 percent, yet the recovery rate was 95.9 percent. The Health Ministry of Republic Indonesia through the Covid-19 Task Force has issued guidelines for preventing and controlling Covid-19 to decrease the death rate and increase the recovery rate. According to the guidelines, a person who undergoes quarantine needs to be provided with health care, and social and psychosocial support. This study seeks to identify the influence of external factors including social support, as well as internal factors including patient motivation, and knowledge on the recovery rate of Covid-19 survivors. The research methods use Structural Equation Modelling to determine the indicators that have the most significant influence on the latent variables of social support, knowledge, and motivation for healing Covid-19. Primary data collection was carried out online with a sample of 176 Covid-19 survivors across Indonesia in August 2021. The methods of the Shapiro-Wilk test for normal multivariate show the p-value at 0.00 significantly satisfies the assumption. The result shows that social support has a significant effect on knowledge with a regression coefficient is 0.263. Knowledge has a regression coefficient is 0.645 for the Healing of Covid-19. In conclusion, the higher social support provided by the patient's external parties: family, surrounding environment, and public health center officers, will impact the higher patient's knowledge and healing of Covid-19 disease. Meanwhile, social support has no significant effect on healing actions.

Keywords: Covid-19 Survivors, Healing Action, Knowledge, Social Support, Structural Equation Modelling.

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1. Introduction

The Health Ministry of Republic Indonesia through the Covid-19 Task Force has issued guidelines for preventing and controlling of Covid-19 to decrease the death rate and increase the recovery rate (Olivia et al., 2020). There were several procedures for the types of Covid-19 isolation based on the guidelines. Confirmed patients without symptoms and patients undergoing self-isolation must follow the rules related to the Infection Prevention and Control Procedure (PCP) and carry out regular monitoring by officers (Kemenkes RI, 2020). In confirmed patients with severe illness would stay in hospital isolation, the officer will provide oxygen therapy starting with the administration of 5 L/min with a nasal cannula and titration to achieve the target SpO2 90% (Tao et al., 2021). This procedure shows that medication adherence and knowledge about COVID-19 symptoms are the keys to getting healing. The statistical problem is we do not know social support and knowledge of the Covid-19 survivors influence the healing action or not and the purpose of the study is to model it in multivariate method.

Self-isolation may be an effective tool to prevent the spread of the COVID-19 pandemic but also may negatively impact mental health for certain groups of people. It is important to identify factors, such as the moderators which may help reduce the negative impacts of social isolation (Szkody et al., 2020). Previous research has shown that people who experience isolation or quarantine have significant changes in their levels of anxiety, anger, confusion, and stress. People outside the quarantine area are afraid of getting infected because of limited or incorrect knowledge about Covid-19 (Brooks et al., 2020). In another study, the factor that affects Covid-19 patients is immunity. The patient should not be stressed, as it significantly reduces immunity. Patients also balance their nutritional intake to optimize the work of the immune system, including protein, carbohydrates, micro-proteins, vitamins, and drinking water. The daily menu of Covid-19 patients at home must be observed. Some herbal plants can also be consumed, especially those containing immunomodulators such as turmeric and curcuma which have antibacterial, anti-inflammatory, and antioxidant properties (Lockyer, 2020). In addition, adequate rest is 6 to 8 hours of quality sleep is necessary.

Based on this background, the scope of the problem is identifying the effect of social support, motivation, and knowledge on the recovery rate of Covid-19 survivors in Indonesia. The Structural Equation Modeling (SEM) method is applied as a measurement technique with latent variables by obtaining a causal relationship. SEM is a statistical technique used to identify latent factors that explain the associations between the item scores of each COVID-19 social support questionnaire, this is what others have not done. This also allows for estimating overarching higher-order latent factors that may point to the similarity or distinctiveness of the identified latent COVID-19 social support constructs (Mertens et al., 2021). Latent variables include knowledge, social support, and healing actions for Covid-19 patients both in hospitals and self-isolation. The results will inform which are the highest and the lowest indicators of each latent variable. In addition, it is presented which indicators and latent variables have a significant or insignificant effect to evaluate the Covid-19 prevention and control guidelines launched by the Indonesian Ministry of Health.

2. Research Methods

2.1 Defining Laten Variable of Social Support

Social support consists of verbal and/or nonverbal information or advice, tangible help or action that is given by social intimacy or obtained because of your presence and has emotional or behavioral benefits for the recipient (Sudarma, 2008). There are 5 (five) social supports:

1. Emotional support, includes expressions of empathy and concern for the person who is being treated for Covid-19 sufferers. Officers feel the pain of Covid-19 sufferers (empathy), take care if there are complaints that are felt, etc.
2. Appreciation support, positive expressions of respect or appreciation for the person, encouragement or agreement with the individual's ideas or feelings, and positive comparisons of that person with others.
3. Instrumental Support, direct support assistance in materials such as: giving loans/giving money to Covid-19 sufferers. If they need financial assistance for transportation costs in treatment or helping by taking medicine to the puskesmas when needed.
4. Information support, information on knowledge about Covid-19 disease, advice if the patient is experiencing stress due to drug side effects or advice and feedback instructions.
5. Network support, having a sense of being part of a group in sharing and social activities. There is a network between Covid-19 sufferers and health workers, especially during treatment for approximately 14 days.

2.2 Defining Laten Variable of Knowledge

Notoatmodjo (2003) explains that a person's knowledge is the initial factor of an expected behavior and it is positively correlated with his actions. Knowledge is the result of "knowing" that occurs after people sense a certain object, individuals know what to do and how to do it, including for treatment. Knowledge about Covid-19 is shared by:

1. Causes and symptoms of Covid-19 which consists of knowing what causes and understanding the early symptoms of Covid-19 disease.
2. Methods of transmission and prevention which consist of knowing the ways of transmission and understanding ways to prevent Covid-19 disease.
3. Drugs, treatment methods, and drug side effects which consist of knowing the Covid-19 drugs that must be taken, getting used to how to take the right drugs, knowing the side effects of drugs and understanding how to handle side effects.

2.3 Defining Laten Variable of Healing Action

Maslow (1994) defines motivation as a driving force that causes humans to try to fulfill their needs. According to Sari (2019), the concept of a patient's healing action can be measured by three components: intensity, direction, and persistence. Motivation with sufficient intensity will give direction to individuals to do something diligently and continuously. Indicators of healing actions are as follows:

1. Intensity: The conditions that strengthen motivation, depends on the size of the motivation. To find out how much the desire to recover from Covid-19, the perception of the disease prognosis, knowing patient's perception of recovering

from the Covid-19 disease, opinions about treatment knowledge to find out how the patient perceives the 14-day treatment.

2. Direction: The behavior direction of Covid-19 sufferers. This situation can be described from treatment behavior, towards follow-up on the disease, and checks according to schedule regularly.
3. Persistent: The behavior that occurs continuously for a particular purpose. This situation can be seen from the regularity of taking medication. It is asked for every day with the assumption that patient still remember an incident correctly.

2.4 Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) is an evolution of the multiple equation model (regression) which was developed from econometric principles and combined with psychological and sociological factor analysis (Hair, 2009). It is possible to check the validity and reliability of the instrument (Confirmatory Factor Analysis), test the relationship model between variables (Path Analysis), and obtain a structural model simultaneously. Complete model (hybrid) in SEM according to (Johnson and Wichern, 2014) in Equation **Error! Reference source not found.**.

$$\boldsymbol{\eta}_{(mx1)} = \boldsymbol{B}_{(mxm)}\boldsymbol{\eta}_{(mx1)} + \boldsymbol{\Gamma}_{(mxn)}\boldsymbol{\xi}_{(nx1)} + \boldsymbol{\zeta}_{(mx1)}.$$

The measurement model describes the relationship between latent variables and indicators expressed in the loading factor (λ) in **Figure 1**.

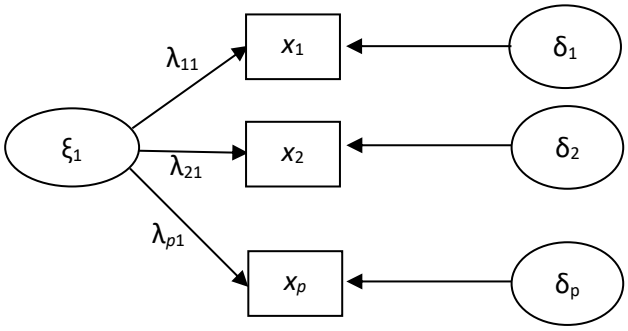

Figure 1: One factor measurement model

Figure 1 mathematically can be explained by the following equation **Error! Reference source not found.**:

$$x_1 = \lambda_{11}\xi_1 + \delta_1$$
$$x_1 = \lambda_{21}\xi_1 + \delta_2$$
$$\vdots$$
$$x_p = \lambda_{p1}\xi_1 + \delta_p$$

The sample size used in the SEM method is a minimum of 100 samples (Ghozali and Fuad, 2008). Multivariate normal is an assumption that must be met. In check the normality data, it calculate the squared distance for each observation (Härdle and Simar, 2019). There are criteria that can be referred to confirm the model (goodness of fit criteria): Comparative Fit Index, Tucker-Lewis Index, and RMSEA. The commonly used rules of thumb are presented in

Table **1**

Table 1: Commonly used criteria

Criteria	Cut off value
CFI, TLI	>0.90
RMSEA, RMSR	<0.08

2.5 Research Methodology

The research methodology of collecting data all over Indonesia through online surveys. The sampling technique used is multistage sampling in 167 responden, applying simple random sampling (SRS) to the first respondent, then determining the next respondent through snowball sampling. Research samples were taken until the sampling quota for each type of isolation was met to provide representative. Determination of the total number of samples using the SRS formula as follows (Scheaffer et al., 2011).

$$n = \frac{Np(1-p)}{(N-1)D + p(1-p)} \text{ where } D = \left(\frac{B}{Z_{1-\frac{\alpha}{2}}}\right)^2$$

The research variable consists of social support, motivation, and knowledge on the recovery rate of Covid-19 survivors in Indonesia. The analytical methods are descriptive statistics, then Shapiro-Wilk test for normal multivariate, check the goodness of fits model, confirmatory factor analysis of each latent variable, and then modeling in Structural Equation Modeling.

3. Results and Discussion

The characteristics of Covid-19 sufferers can be identified through several variables as gender, region, age, occupation, isolation type which shown in

Table 2: Descriptive statistics of covid-19 respondent as follows.

Table 2: Descriptive statistics of covid-19 respondent

Variable	Categorical	Frequency	Percentages
Gender	Men	74	44.3%
	Women	93	55.7%
Region	Java	149	89.22%
	Sumatera	7	4.19%
	Kalimantan	6	3.59%
	Papua	3	1.8%
	Sulawesi	1	0.6%
	Bali	1	0.6%
Age	20-29 years	110	65.87%
	30-39 years	16	9.58%
	40-49 years	14	8.38%
	50-59 years	22	13.17%
	≥ 60 years	5	2.99%
Occupation	Students	69	41.32%
	Civil Employee	20	11.98%
	Private Employee	33	19.76%
	Housewife	12	7.18%
	Lecturer	10	5.99%

	Other	23	13.77%
Isolation Type	Self Isolation	141	84%
	Centralized Isolation	26	16%

Based on the

Table **2**, there were 74 people (44%) as male patients and as many as 93 people (56%) were female patients. The distribution of origin island of Covid-19 sufferers is as follows: 1 person (0.6%) was a patient who came from Bali and Sulawesi. 3 people (1.8%) were patients from Papua, 6 people (3.59%) were patients from Kalimantan. Then 7 people (4.19%) were from Sumatra, and 149 people (89.22%) were from Java. Java has the highest number of sufferers compared to other islands.

The age distribution of Covid-19 sufferers were 110 people (65.87%) patients aged 20-29 years, as many as 16 people (9.58%) were patients aged 30-39 years. Then 14 people (8.38%) were patients aged 40 -49 years, 22 people (13.17%) were patients aged 50-59 years, and the remaining 5 (2.99%) were patients aged 60 years. From all respondents observed, it can be obtained that respondents aged 20-29 years are most exposed to Covid-19.

The occupation of 69 people (41.32%) were students, as many as 20 people (11.98%) were civil servants and 33 people (19.76%) were private employees. Then 12 people (7.18%) were a housewife, 10 people (5.99%) are lecturers, and as many as 23 people (13.77%) work in other fields. The type of isolation carried out by the respondents in this study were 141 people (84%) are self-isolating and the remaining 26 people (16%) are isolating at Health Facilities provided by the Government.

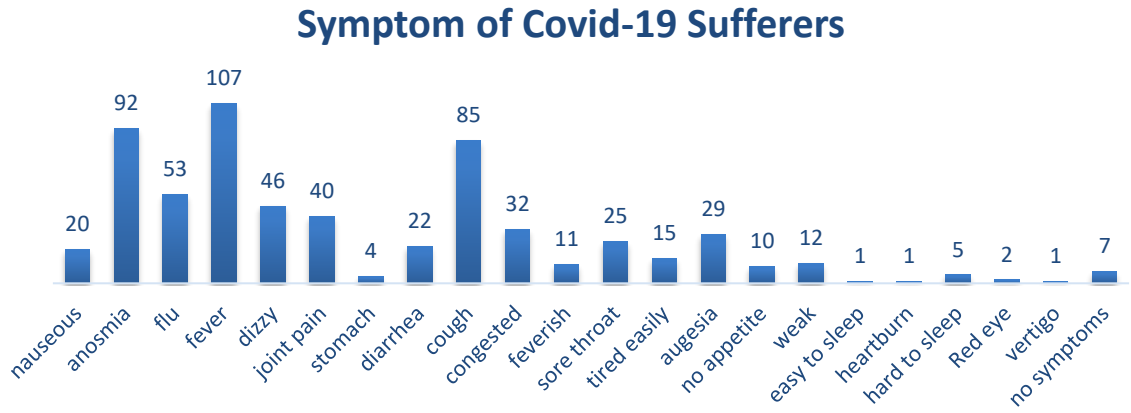

Figure 2: Symptom of Covid-19 Sufferers

Based on Figure 2, the symptoms experienced by Covid-19 sufferers were 107 people (64.07%) experienced symptoms of fever which the highest symptom experienced. Then 92 people (55.09%) get anosmia, as many as 85 people (50.9%) experienced symptoms of cough. There were 53 people (31.74%) experienced symptoms of flu, 46 people (27.54%) get dizziness. Then 40 people (23.95%) experienced symptoms of joint pain, 32 people (19.16%) had shortness of breath. There were 29 people (17.37%) get augesia, 25 people (14.97%) experienced

symptoms of sore throat. as many as 22 people (13.17%) experienced symptoms of diarrhea, and 20 people (11.98%) get nausea.

A total of 15 people (8.98%) experienced symptoms of fatigue, and 12 people (7.19%) get weakness. Furthermore, 11 people (6.59%) experienced symptoms of fever, as many as 10 people (5.99%) experienced symptoms no appetite. Then 8 people (4.19%) did not experience any symptoms or often called OTG, and 5 people (3%) had difficulty sleeping. There were 4 people (2.4%) get stomach pain, 1 person (1.2%) suffering of red eye, sleepiness, heartburn, and vertigo.

After analyzing the descriptive statistics of Covid-19 respondent, then we analyze the structural model to determine the relationship between latent variables. In this analysis, there are 3 presumed models, the social support has a significant effect on knowledge, then knowledge has a significant effect on healing actions, and the social support has a significant effect on healing actions. The SEM presumption model is shown in Figure 3.

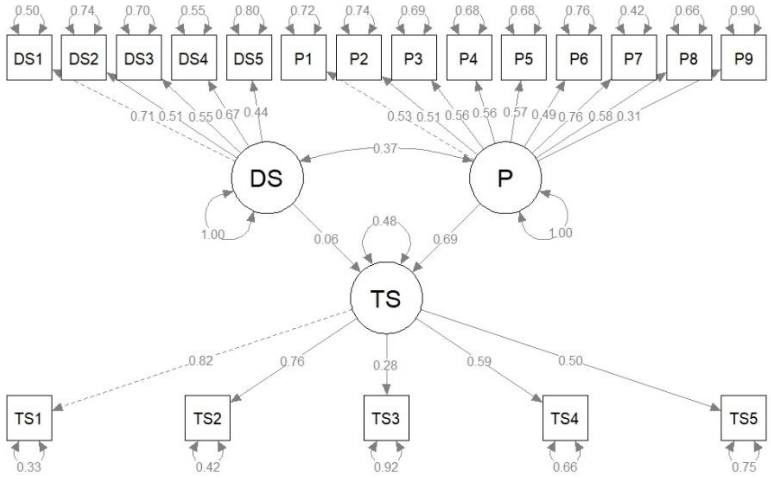

Figure 3. Model 1 of Structural Equation Modelling of Covid-19 Sufferer

Before carrying out further analysis, we should determine the model whether in not identified, only identified, or identified. It is found that s = 190, t = 41, and df = 149 whose value is greater than zero, then the model is said to be overidentified. Because the model is in an overidentified state, it is necessary to do a test to assess the model (goodness of fit) shown in Table 3.

Table 3: Goodness of fit in first model and modified model

Goodness of Fit Index	*Cut Off Value*	First Model	First Model Decision	Modified Model	Modified Model Decision
Chi-Square	Expected small	346.491	Not Eligible	126.248	Eligible
P-value	≥ 0.05	0.000	Not Eligible	0.000	Not Eligible
GFI	≥ 0.90	0.828	Not Eligible	0.910	Eligible
AGFI	≥ 0.90	0.781	Not Eligible	0.867	Eligible
CFI	≥ 0.90	0.781	Not Eligible	0.920	Eligible
RMSEA	≤ 0.08	0.828	Not Eligible	0.067	Eligible

Based on Table 3, the model is quite acceptable after modification of the model. The value of $\chi^2_{calculation}$ is greater than the value of $\chi^2_{table} = 91.67$. The Confirmatory Factor Analysis results show that the DS1 indicator (getting expressions of empathy, concern, and attention given by officers to Covid-19 sufferers) has the largest loading factor value of 0.741. In the knowledge latent variable, the P7 indicator (the purpose of the Covid-19 treatment is to cure the patient, prevent transmission and death and reduce the transmission rate) has the largest loading factor value of 0.767. Meanwhile, the latent variable for recovery measures TS1 indicator (Willing to undergo treatment with administration within a treatment period of approximately 14 days) has the largest loading factor value of 0.924. Then, we test the significance between latent variables by looking at the relationship between the four latent variables.

Table 4: Path coefficient estiomation of sem after modification

Relationship Variable			Path Coefficient	P-*value*	Decision
Social Support	→	Knowledge	0.302	0.003	Significant
Knowledge	→	Healing Action	0.681	0.000	Significant
Social Support	→	Healing Action	0.068	0.405	Not Significant

Based on Table 4, the following equation model is obtained.

$$Knowledge = 0.302\ Social\ Support$$
$$Healing\ Action = 0.681\ Knowledge$$
$$Healing\ Action = 0.068\ Social\ Support$$

From the results of the equation above, the social support has a significant effect on knowledge of 0.302. The interpretation of results according to goals or hypotheses is the higher the social support provided by the patient's external parties, for example from family, surrounding environment, puskesmas officers, the higher the patient's knowledge about the Covid-19 disease. Meanwhile, social support has no significant effect on healing actions. It is mean that the social support provided by external parties for the patient, for example from the family, the surrounding environment and health center staff, is still less influential on the patient's desire to recover, but with external factors, namely knowledge, it has a significant effect on the patient's healing actions. For further evaluation of the model obtained, it would be using a Covid-19 survivor's characteristics like gender, occupation, age, mobility in the last one week, and so on. So that we have the whole modeling including descriptive of the respondent. The relation to other models according to Brooks et al., (2020) research is proving that people who experience isolation or quarantine have significant changes in their levels of stress. People outside the quarantine area are afraid of getting infected because of limited or incorrect knowledge about Covid-19. So that knowledge has a significant effect on the healing action.

4. Conclusions and Suggestions

The independent variable that is Social Support has no significant effect on healing action. It means that the direct Social Support variable about Covid-19 for the community is still less influential on the patient's desire to recover, but with the internal factor namely the knowledge variable, the model can significantly influence the healing action of the Covid-19 patient. The suggestion for the next research is to use a descriptive variable of the Covid-19 patient for the modeling, so that we have a piece of whole information from the model that we build.

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