

## STRUCTURAL EQUATION MODEL OF ARTICLES COVID-19 ON SOCIAL MEDIA TO HEALTH LITERACY AND BEHAVIOR AMONG HEALTH INFORMATION STUDENTS

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### Abstrak

Penyebaran infodemi COVID-19 melalui media sosial dan website menuntut masyarakat untuk mampu mengevaluasi informasi di masa pandemi. Literasi kesehatan adalah kunci untuk mengevaluasi infodemi dan mengambil keputusan tentang perilaku kesehatan. Mahasiswa informasi kesehatan menggunakan teknologi digital seperti media sosial untuk mendapatkan informasi tentang covid-19 sehingga mahasiswa perlu memiliki literasi kesehatan yang baik untuk mengevaluasi infodemik. Tujuan penelitian ini adalah untuk mengetahui pengaruh konten artikel kesehatan covid-19 pada health literacy dan health behavior pada mahasiswa fakultas kesehatan. Data dikumpulkan dengan menggunakan kuesioner pada 142 mahasiswa fakultas kesehatan kemudian dianalisis secara deskriptif dan menggunakan metode struktural equation modelling (SEM). Hasil analisis deskriptif menunjukkan bahwa 70% mahasiswa mengakses informasi covid-19 melalui social media Instagram, dimana lebih dari separuh mahasiswa mengakses konten artikel covid-19 <= 1hari sekali dengan membaca dan menyukai artikel tersebut. Berdasarkan hasil SEM diketahui bahwa faktor terpenting dari konten artikel adalah konten dapat dipercaya, faktor terpenting dari health literacy adalah kepatuhan pencegahan dan faktor terpenting dari health behavior adalah mengurangi kontak dengan orang lain. Dari hasil uji pengaruh SEM diketahui terdapat pengaruh langsung dari artikel konten ke health literacy sebesar 51%. Disisi lain, terdapat pengaruh langsung dari health literacy ke health behavior sebesar 63,4% dan tidak terdapat pengaruh yang signifikan dari artikel konten ke health behavior.

Kata Kunci: Konten Artikel, health literacy, health behavior, social media, covid-19

### Abstract

*The COVID-19 infodemic is spreading through social media and website requires people to be able to evaluate information during a pandemic. Health literacy is the key to evaluating the infodemic and to get the decision making on health behavior. Health information students primarily use digital technologies such as social media to get information about covid-19 so that students need to have good health literacy to evaluate infodemic. The purpose of this study was to determine the effect of covid-19 article content on health literacy and health behavior among health information students. Data were collected using a questionnaire on 142 health information students then analyzed descriptively and using the structural equation modeling (SEM) method. The results of the descriptive analysis show that 70% of students access covid-19 information through social media mainly using Instagram, where more than half of students access covid-19 article content <= once a day by reading and liking the article. Based on the results of SEM, it is known that the most important factor of the article content is trustworthy content, the most important factor of health literacy is adherence to prevention and the most important factor of health behavior is reducing contact with other people. From the results of the SEM effect test, it is known that there is a direct effect of content articles on health literacy of 51%. On the other hand, there is a direct effect from health literacy to health behavior of 63,4% and there is no significant effect from content articles to health behavior.*

**Keywords:** Article content, health literacy, health behavior, social media, covid-19



## INTRODUCTION

In this digital era, almost all levels of society have social media to communicate with friends or colleagues online. Before the pandemic, covid-19 people could easily meet their colleagues, but the Covid-19 pandemic is required people to maintain distance than more safely to interact and communicate online (Adelweis, Nurchayati, and Nuryanti, 2021). Social media is one of the government's options in providing education to prevent Covid-19. People are currently looking for a lot of Covid-19 information through social media which provides detailed information about covid-19 (Xu, Zhang, and Wang, 2020)(Rosário et al., 2020) therefore Covid-19 articles that are easy to understand, interesting, and trustworthy for the public are needed. The COVID-19 infodemic – as valid and invalid health information on COVID-19 (Hua & Shaw, 2020) is spreading through social media and website requires people to be able to evaluate information during a pandemic. Increasing public health literacy can increase the potential for patients to make informed decisions, reduce health risks, improve disease prevention, and improve quality of life (Hashemi-Shahri et al., 2020). Individuals with limited health literacy skills may be most at risk of giving in and spreading misinformation and disinformation on social media (Harnett, 2020). Health literacy is the key to evaluate the infodemic and to get the decision making on health behavior.

Since the implementation of WFH (work from home) during the COVID-19 pandemic in Indonesia, students doing online lectures. With the implementation of WFH, students interact more frequently using digital technologies. Health information students use digital technologies such as social media to get information about covid-19 so that students need to have good health literacy to evaluate infodemic. Health information students are expected to have good health literacy and be able to apply health protocols to prevent Covid-19 transmission in a more disciplined and regular manner (Minh, Taneepanichskul, and Hajek, 2020). The results of research on health literacy among students in Germany show that in health literacy students have difficulty obtaining information and assessing covid-19 articles (Dadaczynski et al., 2021). The results of Mc Caffery's research in Australia stated that people with low health literacy will find it difficult to implement health behaviors in disease prevention (McCaffery et al., 2020). Different from previous studies, a deeper discussion of the effect of covid-19 articles on health literacy, the effect of health literacy on health behavior, and the effect of covid-19 articles on

health behavior among students during the pandemic will be formulated in this study. Therefore, this study aimed to determine the effect of covid-19 article content on health literacy and health behavior during a pandemic.

## RESEARCH METHODS

The research design is quantitative research, which was conducted in October 2020 by giving a questionnaire via google form to health information students in the city of Semarang. The main variable is article content, health literacy, and health behavior. There are four stages of the research: questionnaire construction based on older research, eligibility of questionnaire using validity and reliability, research process, and data analysis.

### A. *Questionnaire Construction*

The google form questionnaire sheet contains questions about article content, health literacy, and health behavior according to the questionnaire. In the article content aspect, three questions were asked about the attractive content display, easily understanding the content, and trustworthy content on a scale of 0-100 was converted to a Likert scale 1-4. In the health literacy aspect, four questions were given regarding access to information, understanding, assessment, and adherence with information related to Covid-19 on a scale of 1-4 (Okan et al., 2020). In the aspect of health behavior, five questions were asked regarding the use of masks, hand sanitizers, keeping a minimum distance of 1 meter, reducing contact with friends, and staying at home during the Covid-19 pandemic (Riiser, Helseth, Haraldstad, Torbjørnsen, & Richardsen, 2020) with a scale of 1-4.

### B. *Eligibility of Questionnaire*

After the questionnaire is formed, the next step is to distribute the questionnaire to 30 respondents to determine the validity and reliability of the questionnaire. If all the question items on the questionnaire are valid and reliable, then all the question items on the questionnaire can be used. 30 respondents fill the questionnaire with the criteria being students of health informatics Universitas Dian Nuswantoro who had a social media. After 30 respondent has filled the questionnaire then validity and reliability are calculated to know the eligibility of the questionnaire. The results of the analysis of the validity and reliability of the questionnaire on 30 respondents were presented in table 1 below.

Table 1. Shows the findings of a questionnaire validity and reliability analysis.

Variable	Indicator	$r_{xy}$	Cronbach's Alpha	$r_{table}$	Remark
Article Content	Content Interesting	0,800	0,759	0,349	valid & reliable
	Content Easy Understood	0,731			valid & reliable
	Trustworthy Content	0,933			valid & reliable
Health Literacy	Information Access	0,690	0,632	0,349	valid & reliable
	Understanding	0,734			valid & reliable
	Assessment	0,512			valid & reliable
Health Behavior	Adherence	0,812	0,650	0,349	valid & reliable
	Mask	0,693			valid & reliable
	Hand Sanitizer	0,654			valid & reliable
	Physical Distancing	0,567			valid & reliable
	Less Contact	0,616			valid & reliable
	Stay at home	0,737	valid & reliable		

Because of all  $r_{xy} > r_{table}$  then all indicator of the questionnaire is valid, and because of all Cronbach's Alpha values  $\geq 0,6$  then questionnaires are reliable. Because all indicators of the questionnaire are valid and reliable the questionnaire can be used.

C. Research Process

After the questionnaire is declared suitable for use, the next step is to distribute the questionnaire to the respondents. The sampling technique was purposive sampling with the criteria respondents are students of health informatics Universitas Dian Nuswantoro who had a social media. These criteria are listed in the questionnaire to ensure that the respondents are by the research targets. A questionnaire was conducted by the student in one month (Oct 2020). At the end of the research, the questionnaire was closed and the total sample size was 142 samples.

D. Data Analysis

Data analysis used a structural equation model (Structural Equation Model / SEM) using SPSS AMOS 19 software where a significant level of  $p > 0.05$  was taken (Kholifah, Yumni, Minarti, & Susanto, 2017). The first step in the SEM method is to build a theoretical model by compiling variables that affect health behavior. Then build path diagrams and structural equations, namely the influence of content articles on health literacy, the influence of health literacy on health behavior, the influence of content articles on health behavior. The next step is to choose an estimated model and assess the suitability of the estimate by selecting the maximum likelihood estimation technique. The last step is to evaluate according to the criteria of the

goddess of fit and interpret the data (Massara, Hakim, Wicaksono, & Basri, 2018). The analysis of the path of the relationship between variables is connected to the graph below.

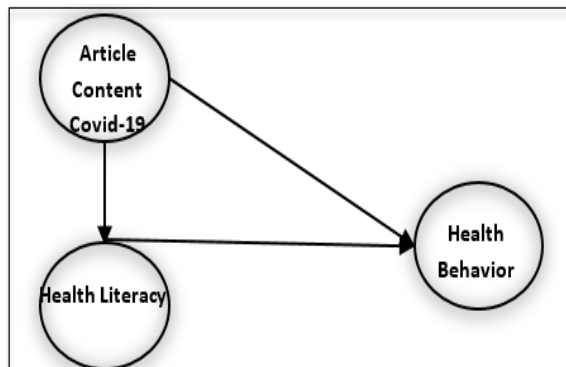


Figure 1. The path of the relationship between variables

Result & Discussion

A. Students Activities on Article Covid-19 on Social Media

Health information students who are respondents are around 18-20 years old. Covid-19 articles are very easy to find on social media by students. Some of the initial analyzes related to the use of social media in getting information about COVID-19 are a source of covid-19 information, social media to get covid-19 information, account social media, frequency access, action on content, interest in content on, and misinformation. The descriptive analysis of the research is presented in table 2 below.



Table 2. Descriptive Analysis Of Students Activities On Covid-19 Content Articles On Social Media

Categ	Description	F	%	Categ	Description	F	%
Gender	Men	112	79%	Frequency access	<=1x per day	87	61%
	Women	30	21%		> 1x per day	55	39%
Covid19 Information	SosMed	100	70%	Actions on content	Read & Like	75	53%
	TV	13	9%		Read	64	45%
Website	29	20%	Read, Like & Share		1	1%	
			Read, Like & Comment		2	1%	
Social Media Type	IG	97	68%	Interest in Content on	Content is updated	19	13%
	Youtube	10	7%		Content is easy to understand	18	13%
	FB	7	5%		Useful contents	36	25%
	Web	12	8%		Content & attractive design	45	32%
	Twitter	13	9%		Complete contents	11	8%
	Line	3	2%	Etc	13	9%	
Account SosMed	Public Health Office	64	45%	Miss Information	Never	33	23%
	Personal (Not Doctor)	13	9%		1-3x	85	60%
	News Portal	40	28%		>3x	24	17%
	Government	14	10%				
	Personal (Doctor)	9	6%				
	Health Organization	2	1%				

From table 2 above, it is known that 79% of respondents are female, while the rest are male. As many as 70% of respondents received information about COVID-19 from social media, while the rest came from the internet or TV. This shows that students use social media more than in getting information about COVID-19 compared to TV and the internet. Instagram is the most widely used social media by students in accessing COVID-19 information. Social media other than IG that are used by students in getting information about covid-19 are Twitter, YouTube, FB, and line. The types of social media accounts that are most widely used by students in obtaining information on COVID-19 are the Ministry of Health accounts, trusted news portals, and government accounts. However, there are still students who get COVID-19 information from personal social media accounts, both doctors and non-doctors.

On average, students access Covid-19 content once a day and almost all students respond to covid-19 articles by reading and reading and like. From the content side of the Covid-19 article, 32% of students said that the content and design of the Covid-19 article were interesting to read, and 25% were concerned about the usefulness of the article. About 60% of students feel that they have experienced misinformation 1-3x from covid-19 content and only 23% say never get misinformation.

B. Structural Equation Modelling Of Article Content, Health Literacy And Health Behavior

To understand the relationship between covid-19 content articles with health literacy and health behavior, SEM analysis was carried out with the following results:

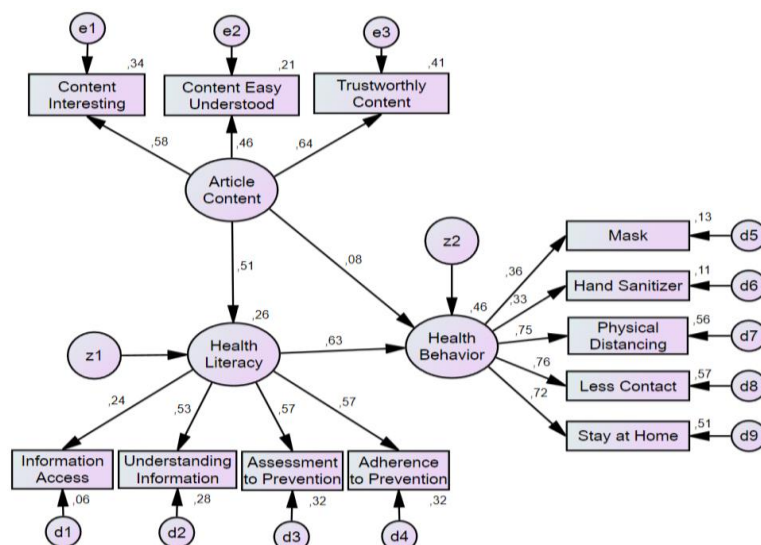


Figure 2. SEM results of article content, health literacy, and health behavior



From Figure 2 it is known that the loading factor of the article is interesting content of 0.58 then the loading factor of the content is easy to understand is 0.46 and the loading factor of the content is trustworthy of 0.64 (Ashoer, Murdifin, Basalamah, As'ad, & Pramukti, 2021). The highest loading factor is trustworthy content, which means that according to students the most important thing from covid-19 article content is that the content is trustworthy, followed by interesting content and easy-to-understand content. From Figure 1, it is known that the health literacy loading factor for information access is 0.24 then the understanding factor loading is 0.53 then the loading factor is 0.566 for the assessment and the loading factor for compliance is 0.569. The highest loading factor is adherence to prevention, which means that according to students the most important thing about the health literacy of Covid-19 is being able to adherence to prevention Covid-19 from Covid-19 information, followed by being able to assess prevention from Covid-19 information understanding the Covid-19 article and easy access to information covid-19. From Figure 1, it is known that in the health behavior, the loading factor for the mask is 0.36, then the hand sanitizer loading factor is 0.33 then the loading factor keeps the distance 0.75 then the loading factor is less contact 0.76 and the loading factor stays at home 0.72. The highest loading factor is limiting contact with other people, which means that according to students, the most important thing about the health behavior of Covid-19 is limiting contact with other people, keeping a minimum distance of 1 meter, then staying at home, wearing a mask and use a hand sanitizer.

C. *The goodness of Fit SEM*

The analysis of goodness of fit from the SEM results model of article content, health literacy,

and health behavior is presented in table 3 below (Kim, Cho, & Kim, 2017):

Table 3. The goodness of Fit model SEM

The goodness of the Fit index	Cut off value	Result of the Model	Model Evaluation
Chi square	≤ 68,67	65,056	Good Fit
Probability	≥ 0,05	0,089	Good Fit
RMSEA	≤ 0,08	0,044	Good Fit
IFI	≥ 0,90	0,952	Good Fit
GFI	≥ 0,90	0,931	Good Fit
AGFI	≥ 0,90	0,894	Marginal Fit
CMIN/ DF	≤ 2,00	1,276	Good Fit
TLI	≥ 0,90	0,934	Good Fit
CFI	≥ 0,90	0,949	Good Fit

From table 3 it is known that all factors of the goodness of fit model can be accepted with good fit and marginal fit. The chi-square model is 65,056 with a significance level of 0.089, which is a fit to the expected criteria. The measurement indices RMSEA, IFI, GFI, CMIN / DF, TLI, and CFI are within the expected and well-accepted ranges, except AGFI which is closed to the expected criteria indicating that the AGFI is quite good and accepted with the marginal fit. With the accepted model, the results of parameter testing can be used.

D. *Direct and Indirect effect of Article Covid-19, Health Literacy and Health Behavior*

Following are the results of the SEM analysis of the direct and indirect effects between the research variables which are presented in table 4.

Table 4. The influence of content articles, health literacy, and health behavior

Independent	To	Dependent	Direct Effect			Indirect Effect
			St Loading	C.R.	P	
Article_Content	--->	Health_Literacy	0,510	2,688	0,007	-
Health_Literacy	--->	Health_Behavior	0,634	2,433	0,015	-
Article_Content	--->	Health_Behavior	0,08	0,504	0,615	0,323

From the table above, it is known that in the article content to health literacy the P-value is 0.007 <0.05 and CR 2.688 > 1.96 so that there is a direct effect of the content article on health literacy of 0.510 or 51%. In health literacy to health behavior, the P-value is 0.015 <0.05 and CR 2.433 > 1.96 so that there is a direct influence from health literacy to health behavior of 0.634 or 63.4%. In the content article on health behavior, the P-value was

0.504 > 0.05 and CR 0.504 < 1.96 so that there was no significant effect from the content article to health behavior where the effect was only 8%. While the indirect effect of content articles on health behavior is obtained from multiplying the effect of content articles on health literacy and health literacy to health behaviors, namely 0.510 x 0.634 = 0.323, so the indirect effect of content articles on health behaviors is only 32.3%.



Based on the results of the study, it is known that 70% of students get information about Covid-19 through social media. This is similar to the results of Fauzi's research which states that students get the most health information from social media (Fauzi et al., 2020). Trustworthy social media accounts are the most important factor that students pay attention to in the content of covid-19 articles whereas most students get covid-19 content articles from government and health agency accounts. The government collaborates with social media platforms such as FB, IG, and others in improving health literacy and reducing misinformation (Chong, Cheng, Chan, Chien, & Wong, 2020). Adherence to prevention is the most important factor for students in health literacy. Understanding is not the most important factor for students in health literacy, with more than half of the students stating that they had experienced misinformation 1-3 times, even 23% of students had more than 3 times of miss information. This needs special attention because information spread on social media can provide benefits and can also lead to misinformation (Apuke & Omar, 2020). Eliminating misinformation can help social media users gather and disseminate accurate information, help them stay safe, and reduce risks to others (Limaye et al., 2020).

Limiting physical contact with other people is the most important factor for students in implementing healthy behavior. This is different from the results of Kushner's research which showed that washing hands is the most important factor in health behavior during a pandemic for the community (Kushner Gadarian, Goodman, & Pepinsky, 2020). Meanwhile, according to the results of Olapegba's research, it was stated that the most important factor in the health behavior of Nigerians is to stay at home (Olapegba et al., 2020). Based on the results of the influence test, it is known that there is an effect of covid-19 content articles on health literacy and there is an effect of health literacy on health behavior. This is consistent with the results of a study that states that a higher health literacy (HL) or eHEALS score has better adherence to IPC procedures, a healthier lifestyle, and a lower likelihood of symptoms of COVID-19 (Do et al., 2020).

## CONCLUSION

From the results of descriptive analysis, it is known that 70% of students access covid-19 information through social media mainly using Instagram, where more than half of students access covid-19 article content =< once a day by reading and liking the article. Based on the results of SEM, it is known that content can be trusted to be the most

important factor of covid-19 article content where more than half of students access social media accounts from the health office and the government to get covid-19 information. In addition, interesting content is the next important factor in covid-19 articles where more than half of students are interested in content design and usefulness of the article. Content that is easy to understand is the last factor to pay attention to in the content of covid-19 articles where more than half of students have experienced misinformation 1-3 times.

Based on the results of SEM, it is known that the adherence to following the prevention recommendations from the Covid-19 article is the most important factor in health literacy, followed by being able to assess to prevention of Covid-19 from Covid-19 article, understanding and the ease of access to Covid-19 information. Meanwhile, the most important factor of Covid-19's health behavior is limiting contact with other people, keeping a minimum distance of 1 meter, then staying at home, wearing a mask, and using a hand sanitizer. From the results of the analysis of the goodness of fit factor, it is known that the model can be accepted with good fit and marginal fit. From the results of the effect test, it is known that there is a direct effect of content articles on health literacy of 51%. On the other hand, there is a direct effect from health literacy to health behavior of 63,4% and there is no significant effect from content articles to health behavior.

Based on these results, the covid-19 article has quite affected the health literacy of students, so in evaluating articles it is better to use a hoax website checker provided by the government to get trustworthy content. In addition, health literacy is also quite influential in health behavior so that students are expected to be able to learn, understand and comply with health protocols properly so that it becomes a habit in their daily lives.

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