The Effectiveness of Epidemic Information on Public Cognition of Vaccines

Yuting Li[1, a, †], Yuan Meng[2, b, †], Yizhuo Wang[3, c, †, *]

[1]*Faculty of Art and Design, Shanghai Normal University Tianhua College, Shanghai, 201815, China*

[2]*College of Journalism and Communication, Henan University, Kaifeng, Henan, 475011, China*

[3]*College of Liberal Arts, Journalism and Communication, Ocean University of China, Qingdao, Shandong, 266100, China*

Corresponding author. Email: wangyizhuo1785@stu.ouc.edu.cn

[†]*These authors contributed equally.*

Abstract: Nowadays, COVID - 19 outbreak still exists throughout the world and seriously affects people's lives, since the new crown vaccine on all kinds of media information about the vaccine, and people also never stopped, the discussions of the vaccine in this paper, the authors take the form of a random questionnaire, exploring a certain number of people. This paper investigated the relationship between the public's cognitive demand for vaccine information and attention level on the amount of vaccine knowledge they acquire and the degree of relevant thinking, and used the Cognitive Mediation Model (CMM) to conduct a series of data analyses, and observe some phenomena. For example, the public's perception of vaccine information demand positively related to public attention, focus on epidemic information level, and the relationship between the public's perception of vaccine information demand was positively associated with the degree of involvement with the public to think. The public of vaccine information and relational thinking levels was positively related to the level of attention level and public attention to vaccine information for vaccine utility were positively correlated

Keywords: COVID-19 Public Cognition Vaccine Cognitive Media Model Theory.

1. Introduction

1.1 Research Background

The outbreak of the new crown virus pneumonia epidemic at the end of 2019 as a public health emergency has triggered changes in public emotions, cognition, behavior, and other aspects, although the current epidemic situation has improved compared with before, the epidemic is still spreading among the population. With the study of the COVID-19, on December 31, 2020, the State Drug Administration approved the conditional listing of the new coronavirus inactivated vaccine of China Biological Beijing Institute of Biological Products Co., Ltd. As of March 29, 2021, four Chinese manufacturers have approved the conditional release of COVID-19 vaccines, including three inactivated vaccines, one adenovirus vector vaccine, and one recombinant protein vaccine. At

present, the country is safely and orderly accelerating the vaccination of the new coronavirus. However, the discussion of vaccines has never stopped. Especially in the modern society of rapid development of the Internet, many people trust and vaccinate because of online information, but some people are also skeptical of vaccines because of online information. They are concerned about the feasibility and effectiveness of the vaccine. There are even people who are resistant to vaccines and who are very reticent about getting vaccinated. If the vaccination program is to continue, the country's public health experts and government officials also face significant challenges. The Harvard Business Review article notes that people are hesitant to vaccinate largely because of mistrust, including the country's health service system, pharmaceutical companies that roll out vaccines at breakneck speed, vaccination advocates, and governments responsible for monitoring and promoting vaccines.

1.2 Research Gap

The theme of the exploration is whether information on the internet affects people's attitudes and opinions about vaccines and their willingness to get vaccinated. Investigating this issue has benefits to understanding the impact of information on people's psychological thoughts, and facilitating the government to take further relevant measures to answer people's concerns about vaccines, optimize vaccines, increase vaccination rates, help control the epidemic, and alleviate people's doubts and distrust of vaccines. Currently, there is a lack of similar exploration in academia.

The previous studies sought to analyze the psychology of the public during the COVID-19 pandemic, and it can help to elaborate on some of the public's attitudes toward vaccines. In these surveys, univariate ANOVA was statistically analyzed using the Post-Traumatic Stress Disorder Scale, The State Anxiety Scale, the Depression Self-Rating Scale, the Suicidal Ideation Self-Rating Scale, and the Elevated Insomnia Scale. The highest incidence of psychological problems in the public is anxiety, followed by anxiety (97.75%), depression (97.48%), insomnia (69.25%), post-traumatic stress disorder (4.75%), and suicidal ideation (0.00%) [1]. Psychological problems such as anxiety, depression, insomnia, and post-traumatic stress disorder are high, with significant differences in demographic variables such as gender, age, educational background, and marital status. During the COVID-19 pandemic, the incidence and severity of psychological problems in the public are high, and there are significant differences in demographic variables. This conclusion showed the negative public attitude towards the epidemic, which it considers to be a positive sign of universal vaccination. However, surveys of willingness to vaccinate are mainly targeted at certain populations, such as children and some occupations. It does not include major groups of people in the network, such as young adults between the ages of 18 and 50. However, they are the subjects of this paper's exploration, and this is a gap that it must fill. Content analysis of some vaccination cases, such as HPV, found that most propaganda calls for fear and places more emphasis on propaganda. However, it believes that public opinion also has a great influence on the willingness to vaccinate, so it pays attention to public psychology and cognition.

1.3 Fill the Gap

The theme of this paper's exploration is whether online information affects people's attitudes and perceptions about vaccines and their willingness to get vaccinated. Investigating this issue helps to understand the impact of information on people's psychology and thinking, and also helps the government to take further measures to answer people's concerns about vaccines, optimize vaccines, increase vaccination rates, help control the epidemic, and alleviate people's concerns about vaccines. Suspicion and distrust. At present, there is still a lack of similar exploration in academia. The main

group of young people in China is 18-30 years old because this group is most affected by online information. They are avant-garde young people, most of whom are highly educated.

It will confirm this paper's views through the data analysis method and content analysis method, first of all, collect a large amount of data, consult the literature, conduct extensive research and research, mainly from the data, and observe the degree of influence of network information on the change of the survey subject; Secondly, through literature citations and deductions, it is further proved that with the change of time, the network information will indeed weaken people's cognitive demand for vaccine information; Finally, through statistical analysis tools such as SPSS, the network information of each period was compared with the data of people's willingness to vaccinate.

In this way, it can not only cite this paper's point of view, but also detect visual research, analysis and quantitative display of data, which is more credible, thereby improving the network environment, alleviating public anxiety, further increasing vaccination rates, and controlling the spread of the epidemic more stabler and faster.

2. Literature Review

2.1. Cognitive Media Model Theory

CMM theory has an exploration history of about 20 years, that is, the cognitive media model [2]. First proposed in 2001, it was proposed and conceptualized by Eveland. CMM is a comprehensive model that lets people know how to learn in news [3]. In the model, CMM theory also integrates the data of psychology and other disciplines. This is precisely the feature of this model that it can absorb the latest research results of neighboring disciplines. The participation of the CMM model in news content and the relationship between learning news emphasize that cognitive processing plays a very important role in news learning [4]. It studies the relationship and potential connection between media reports and knowledge acquisition motivation [5]. In this regard, the CMM model is an important tool. The model also clearly points out that the motivation of news monitoring is to find possible relevant materials, the method is to scan or search information sources, and attention and elaboration, which together constitute the news learning factors pointed out in the model.

The result variable of CMM in the early research is political knowledge. In the initial CMM, the key factor of Eveland affecting people's attention and processing of news information is personal motivation, and this information will change the acquisition of knowledge. The focus of the spiritual effort of personality is defined as news attention [6]. News attention is a necessary means of knowledge acquisition, but it is not the only sufficient omen. Eveland further elaborated on the impact of news attention on knowledge in 2001, and was defined as "the process of connecting new information with other psychological information stored in memory". However, in recent years, CMM can also be used to understand and acquire health knowledge in a healthy environment [6,7]. Now, this view has also been recognized by many scholars [7].

2.2. Important Results

In 2011, Jason discovered the supporting model data, which is related to cancer news reporting and learning background [8]. In his research, he formulated the conclusion that news surveillance motivation is positively correlated with story understanding, but it has nothing to do with the recall of facts. Moreover, Jason also detects that refinement plays an intermediary role between news surveillance motivation and story understanding, Thus, it can promote greater reflection, that is, refinement, and then predict the understanding of the news. The evidence provided by this exploration can show that people's attention to news reports plays a regulatory role in indirect

relations.

In a paper published in the Journal of health communication in 2013, SOH Veronica we used the CMM theory and cognitive mediation model as the theoretical framework to investigate the impact of investigation motivation, communication, and news elaboration on the H1N1 influenza knowledge and preventive behavior of the public in Singapore [9]. They conduct an investigation of the telephone numbers of 1055 Singaporeans and found that the cognitive mediation model can be used in health-related scenes, and motivation (surveillance gratification, guidance, cognitive needs) and news attention elaboration and interpersonal communication are significantly positively correlated [9].

For another example, in a paper published in 2013, MC et al. investigated the problems related to the use of online games by teenagers aged 12 to 22, applied the cognitive mediation model of Internet use to the environment of online game use, and concluded that the cognitive mediation model of problematic Internet use can also be applied to online game use, and confirmed that the lack of self-regulation is the key factor of negative results, Preference for online social interaction and emotion regulation is also very important[10].

Zhang et al. in unveiling the veil of news - a double intermediary model of trust based on cognitive and emotional perspectives, used the research method of a questionnaire survey and selected more than 400 enterprises from many provinces in China as the survey objects, adopted six independent variables to measure cognitive trust and four dependent variables to measure innovation performance, and introduced intermediary variables, namely opportunistic behavior and internal status perception, through relevant research analysis and regression analysis, the conclusion is discovered. The study believes that trust is one of the important factors in cooperation in Chinese society. There is an obvious positive relationship between emotional trust and innovation performance, and it also affirms the intermediary role of opportunism in the relationship between the two sides. However, this study still has some shortcomings, that is, it does not use the method of multiple time points for measurement [11]. Thus, it ignores that there may be deviations in the results due to changes in time, and this study will be affected by individual information and cognitive limitations, with subjective factors. In the future, more objective data can be used for research to obtain more accurate data and scientific results.

2.3. Hypothesis

It set up five independent variables in this study. It draws the following conclusions with the above conclusions of the former research information.

H1: There is a positive correlation between the public's cognitive demand for vaccine information and the public's attention level to epidemic news/newspaper news

H2: the cognitive demand of the public for vaccine information is positively correlated with the degree of relevance thinking of the public

H3: the public's attention level to vaccine information is positively correlated with the degree of relevance thinking

H4: the public's attention level to vaccine information is positively correlated with the amount of vaccine knowledge it has obtained

H5: there is a positive correlation between the public's degree of thinking about the relevance of vaccine information and the amount of vaccine knowledge they acquire

3. Methodology

3.1. Research Design

Need for cognition. Adapted from Eveland's study [2]. Using a seven-point item (1= strongly disagree, 7= strongly agree), asked respondents to indicate their agreement with the following reasons for keeping themselves informed about vaccines: 'It wants to get information about vaccines because it has a cognitive need. '

Attention. The previous research scale is still a seven-point project to evaluate respondents' attention to the outbreak information from two aspects (a) 'I will follow TV news/newspaper news related to the outbreak. ' (b) 'I read on social media for feedback after others have been [3]. '(M = 5.60, SD = 1.57, Cronbach's α =.71)

Elaboration. Following the model of Eveland et al. (2004) and Ho, Scheufele, and Corley (2011), a seven-point item (1= strongly disagree, 7= strongly agree) is used to reflect the degree of Elaboration of the information provided by the respondents [2,3,7]. Respondents were asked to answer three questions: (a) 'I will read the information about vaccines more carefully. ' (b) 'I think about vaccines Information. (c) 'When I read about vaccines, I think of other things that are known [1,6]. ' (M = 5.66, SD = 1.47, Cronbach's alpha =. 84)

To assess respondents' Knowledge of COVID-19 vaccine, seven questions were integrated [9,10]. For each question, respondents are required to answer T or F, and finally form a full score of 7 cognitive evaluation Table: (a) 'Inactivated COVID-19 vaccine requires two injections, Spaced at least 28 days apart. (T) '(b)' isolated month after vaccination against COVID-19. (F) '(c)' The Protective effect of the NEW CROWN vaccine can last for half a year. (T) '(d)' Vaccination against COVID-19 is not recommended at the same time as vaccination against other vaccines, (E) Seafood/egg/ captive cannot be against COVID-19. (F) (F) People with chronic diseases can be vaccinated against COVID-19 during the non-onset phase and with the availability of their (T) '(g)' Pregnant women can be against COVID-19. (F) '

3.2. Data Collection

Data for this study was collected through an online survey panel. The web-based questionnaire was issued by King Data. In the process of questionnaire distribution, a convenient survey method was used, and 104 questionnaire samples were collected on the WeChat social platform. Attentional filtering questions were used in the questionnaire to ensure that respondents read each question and all relevant response options before choosing the answer.

3.3. Data Analysis

Table 1 showed that the total number of samples is 104. Demographic variables showed that respondents were mainly between the ages of 18 and 25 in Table 2. In terms of gender, Table 3 showed that 62.5 percent of respondents were male and only 37.5 percent were female. This difference is due to statistical differences, and gender differences have not been reflected in the existing vaccine cognition studies, so it does not affect the results of this study. In terms of the number of COVID-19 vaccinations, Table 4 showed that 74.0 percent received three shots, 21.2 percent received two shots, and only 4.8 percent did not. (Jiang Xiaoyong, Li Jingjie, Chen Zhuo, Ning zhu,2022)

Table 1: Statistics.

		Age	Gender	Number of COVID-19 vaccinations
N	Valid	104	104	104
	Missing	0	0	0

Table 2: Age.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<18	5	4.8	4.8	4.8
	18~25	73	70.2	70.2	75.0
	26~30	7	6.7	6.7	81.7
	31~40	6	5.8	5.8	87.5
	41~50	11	10.6	10.6	98.1
	51~60	1	1.0	1.0	99.0
	60<	1	1.0	1.0	100.0
	Total	104	100.0	100.0	

Table 3: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	39	37.5	37.5	37.5
	Male	65	62.5	62.5	100.0
	Total	104	100.0	100.0	

Table 4: Number of COVID-19 vaccinations.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	5	4.8	4.8	4.8
	Third	77	74.0	74.0	78.8
	Twice	22	21.2	21.2	100.0
	Total	104	100.0	100.0	

The Cronbach's α coefficient and constituent reliability (CR) shown in Table 5 are both higher than 0.7, indicating good reliability and high reliability of the scale.

Table 5: Reliability Statistics.

Variable	Cronbach's Alpha	N of Items
Attention	.715	2
Elabration	.839	3

Table 6 showed that KMO = 0.8 > 0.7, sig = 0.000 < 0.001. The independent variables in the questionnaire were related to some extent, and the questionnaire was valid and in line with factor analysis. Extractions in Table 3 are all above 0.5, proving variables can be expressed by common factors. Extractions of att1 and ela2 are above 0.7, indicating that the variable was well expressed by common factors.

Table 6: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.800
Bartlett's Test of Sphericity	Approx. Chi-Square	355.981
	df	15
	Sig.	.000

Table 7: Communalities.

value	Initial	Extraction
cognition	1.000	.551
att1	1.000	.720
att2	1.000	.573
ela1	1.000	.667
ela2	1.000	.708
ela3	1.000	.593

Extraction Method: Principal Component Analysis.

Table 8: Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.811	63.524	63.524	3.811	63.524	63.524
2	.853	14.211	77.735			
3	.535	8.916	86.651			
4	.365	6.087	92.738			
5	.267	4.447	97.185			
6	.169	2.815	100.000			

Extraction Method: Principal Component Analysis.

All variables are shown in Table 9 with high degrees of correlation, and there is no multicollinearity problem.

Table 9: Correlations.

		cognition	attention	elaboration	knowledge
cognition	Pearson Correlation	1	.664**	.526**	.272**
	Sig. (2-tailed)		.000	.000	.005
	N	104	104	104	104
attention	Pearson Correlation	.664**	1	.724**	.249*
	Sig. (2-tailed)	.000		.000	.011
	N	104	104	104	104
elaboration	Pearson Correlation	.526**	.724**	1	.149*
	Sig. (2-tailed)	.000	.000		.132
	N	104	104	104	104
knowledge	Pearson Correlation	.272**	.249*	.149*	1
	Sig. (2-tailed)	.005	.011	.132	
	N	104	104	104	104

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 10 showed the adjusted R Square is close to R Square, and the model is suitable. Regression showed high significance in Table 11, and the residual mean square is 1.474 which means less error in statistics. Unstandardized coefficients B in Table 12 showed that the influence degree from large to small is attention, cognition and elaboration.

Table 10: Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.293[a]	.086	.058	1.214

a. Predictors: (Constant), elaboration, cognition, attention.

Table 11: ANOVAa.

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	13.804	3	4.601	3.121	<0.01[b]
1	Residual	147.417	100	1.474		
	Total	161.221	103			

a. Dependent Variable: knowledge

b. Predictors: (Constant), elaboration, cognition, attention

Table 12: Coefficientsa.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.231	.545		5.927	.000
1	cognition	.163	.106	.198	1.539	<.001
	attention	.142	.126	.179	1.127	<.001
	elaboration	.072	.119	.084	.607	<.001

a. Dependent Variable: knowledge

4.   Results

H1: The public's cognition of vaccine information is positively correlated with the attention to the news (p=. 664**)

H2: The public's cognition of vaccine information is positively correlated with the elaboration (p=. 526**)

H3: The public's cognition of vaccine information is positively correlated with the amount of vaccine knowledge they have acquired (B=.163, Sig<0.001, p=. 272**)

H4: The attention to vaccine information in the public is positively correlated with elaboration (p=. 724**)

H5: The attention to vaccine information in a public is positively correlated with the amount of vaccine knowledge they have acquired (B=.142, Sig<0.001, p=. 249*)

H6: The degree to which the public thinks about the relevance of vaccine information is positively correlated with the amount of vaccine knowledge they have acquired (B=.072, Sig<0.001, p=. 149*)

5.   Discussion

This exploration investigates the change in the degree of influence of network information on the public perception of the new crown vaccine during the new crown epidemic and its mechanism, which not only enriches people's understanding of the power of network information, but also fills the research gap on the impact of network information changes on new crown vaccination during the new crown pneumonia epidemic, and also provides a scientific theoretical basis for improving the public's scientific cognition under the normalization of the epidemic development trend. The results of this study found that during the epidemic, online information showed a significant

positive correlation with the public's cognitive demand for COVID-19 vaccines, and at the same time, the guiding trend of online information played a role in regulating the public's attention level to COVID-19 vaccines.

Evidence from Jason's 2011 study found that attention to news coverage plays a moderating role in indirect relationships. Ho Shirley S and Peh Xianghong examine that cognitive mediation models can be used in health-related scenarios, where motivation (surveillance gratification, guidance and cognitive needs) is significantly positively correlated with the elaboration of journalistic attention and interpersonal communication [7]. In addition, MC et al. have all demonstrated and confirmed their research problems through CMM [12]. Among them, Jason et al. draw conclusions that are consistent with this paper that H1 is a positive correlation between the public's cognitive need for vaccine information and the level of attention the public pays to epidemic news/newspaper news [10]. And this paper also supplements the CMM theory based on previous research: H2 is that the public's cognitive demand for vaccine information is positively correlated with the public's degree of association thinking; H3 is where the level of attention of the public to vaccine information is positively correlated with the degree of associative thinking; H4 is a positive correlation between the level of attention of the public to vaccine information and the amount of vaccine knowledge they have acquired; H5 is that the degree to which the public thinks about the relevance of vaccine information is positively correlated with the amount of vaccine knowledge it has acquired. It can demonstrate that government departments should pay more attention to the importance of online information, actively carry out psychological dredging and guidance, help the people alleviate the anxiety and tension of the epidemic, and strive to maintain social stability and harmony.

6.   Conclusion

Based on the above correlation analysis results, this study further tests the mediating role of the orientation of network information in the evaluation of the new crown vaccine. As a result, online information does play a part in the mediating role in the public's perception of the NEW CROWN vaccine. This may be because more people who believe in online information have increased their awareness of "being able to avoid infection with new crown pneumonia through their efforts", and then actively do a good job of protection under the call of the government and the media, complete the whole process of vaccination, and prevent the spread of the disease. As the growth rate of COVID-19 infections and deaths slows down, people's worries and fears about their illness also decline, which in turn reduces their attention to the epidemic itself, and the reduction of attention to epidemic-related online information also helps people better adjust their mental health, resulting in a reduction in depressive symptoms.

In addition, this paper also examines the moderating effect of network information on the public's cognitive demand for vaccine information. The results show that the orientation of network information does adjust the public's predictive effect on the efficacy of the new crown vaccine, that is, when positive network information appears, the public's willingness to vaccinate against the new crown vaccine increases. However, the regulatory role of online information in the public's perception of COVID-19 vaccines is not significant. Exploring the reason for this may be that the public's attention to vaccine information has decreased after receiving the full-course COVID-19 vaccine. At the same time, due to the strong spread and wide range of the epidemic, the corresponding preventive drugs have not yet been released, and the public's concerns about their health and the future still exist, resulting in the public's awareness of the new crown vaccine being greatly regulated by network information, and the regulatory variables of the degree of public thinking about the correlation between network information and vaccine information have yet to be studied.

The study also has shortcomings: for questionnaire distribution, the middle-aged group has

certain limitations due to the certain obstacles to filling out questionnaires due to the distribution of questionnaires through the Internet and mainly disseminated on social media, so the overall sample has certain limitations. When it comes to sensitivity, the survey sets up two dependent variables that are similarly expressed, but the statistical significance of the sample data is very different, and whether the public believes that the vaccine is harmful to the body is not directly related to several independent variables and the public's trust in the effect of the vaccine, in other words, the threat and reliability of the vaccine to the human body are not the same concepts.

In addition, the overall data of the average daily social media usage time is high, and more than 40% of the samples chose the maximum value (>4h), which affects the reliability of this variable to some extent.

Vaccination status can be reflected in the number of needles, but the number of needles is not a linear index. It is generally believed that 2 doses of vaccination are completed, and in China, the vaccine has been widespread for a year, and there are very few cases of only 1 injection (considered to be in vaccination, but not yet completed) The survey converts descriptive statistics about vaccination into quantitative data and fits them in the equation of univariate linear regression related to vaccine cognition, which can verify the correlation but is not stable enough.

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