

Study on the Path Relationship Between Residents' Health Awareness, Health Behavior and Health Satisfaction

Hongmei Li*

College of Science, North China University of Technology, Beijing, China

Keywords: Health Awareness, Health Behavior, Health Satisfaction, Structural Equation Model, Path Analysis.

Abstract: In the past over two years, COVID-19 has greatly changed people's health awareness and health behavior, which further affects people's subjective perception and satisfaction with personal health. Health status has increasingly become one of the most important indicators to reflect people's yearning for a better life. Based on the questionnaire survey data, using Amos software to construct a structural equation model, this paper makes an in-depth study on the impact and path relationship between residents' health awareness, health behavior and health satisfaction, and draws some meaningful conclusions. The result shows that the direct effect of health awareness on personal health satisfaction is relatively weak, but the indirect effect is very significant through the intermediary effect of the variable "health behavior". At the same time, it shows that people's health awareness has a strong direct effect on health behavior, and health behavior has a strong direct effect on personal health satisfaction perception. At last, this paper puts forward some reasonable suggestions for the government and relevant management and service departments in the aspects of "health science publicity", "nutrition catering", "improving the medical and health system" and "leisure and fitness services".

1 INTRODUCTION

Since the beginning of 2020, the sudden COVID-19 has brought an unprecedented disaster to mankind, greatly reducing people's sense of happiness and security. However, under the difficult situation, the epidemic has its positive side. It has greatly awakened human awareness of public health and safety. The most prominent performance is that people's health awareness has generally improved. They take the initiative to understand the development of epidemic situation, promote scientific epidemic prevention, and pay attention to health preservation, environmental quality and waste classification. Their awareness of food safety has also been significantly strengthened. Reflected in action, people tend to care more about their own health, increase the amount of fitness exercise significantly, and pay more attention to nutrition in daily diet and routine physical examination.

In order to study these changing characteristics of the people in a more detailed way, further study what

aspects of the people's health awareness and health behavior are reflected, what factors people's health satisfaction perception mainly come from, and what is the action path between these variables, firstly, we specially organized a questionnaire survey. Secondly, using the survey data, we constructed a structural equation model by means of Amos software, and conducted an in-depth study on the impact and path relationship between variables such as "health awareness", "health behavior" and "health satisfaction". Thirdly, based on the research results, we have drawn some meaningful conclusions. Finally, in the aspects of "health science publicity", "nutrition catering", "improving the medical and health system", and "leisure and fitness services", we have put forward some reasonable suggestions for the government and relevant management and service departments.

* Li Hongmei, College of science, North China University of Technology, No. 5, Jinyuanzhuang Road, Shijingshan District, Beijing, 100144.
(Tel: 18610988259. E-mail: lhmei6280@163.com)

2 VARIABLE SELECTION AND DATA DESCRIPTION

In order to study the relationship between people's health awareness, health behavior and health satisfaction perception, we set up a group of attitude

scales related to health with the 5-level Likert scales in the questionnaire. The options of the scales are "very agree", "agree", "general", "disagree" and "very disagree", and the values are 5, 4, 3, 2 and 1 respectively. The items and corresponding variables are shown in Table 1.

Table 1: Correspondence between items and variables.

Item	Variable	Item	Variable
1.I am very concerned about health preservation and health knowledge.	(V1) Regimen	6. I have a regular physical examination at least once a year.	(V6) Regular physical examination
2.I am very concerned about the epidemic development and scientific epidemic prevention.	(V2) Epidemic prevention	7.I can achieve a reasonable diet every day.	(V7) Reasonable diet
3.I actively advocate garbage classification.	(V3) Garbage classification	8.I do fitness exercises at least three times a week.	(V8) Regular fitness
4.I am very concerned about environmental quality and adhere to the green concept.	(V4) Quality of environment	9.I personally have a good sense of health.	(V9) Perceived satisfaction
5.When buying food, I will carefully check the production place, shelf life, ingredients and other information.	(V5) Food safety	10.I personally have good health behavior.	(V10) Behavioral satisfaction

We distributed questionnaires in Beijing and finally collected 561 valid questionnaires. First, the reliability of the data is tested, Cronbach's alpha=0.871, indicating that the data has a high level of reliability. At the same time, KMO and Bartlett's test is carried out on the data, and the KMO coefficient is 0.920>0.5, sig.=0.000, which meets the conditions of factor analysis. And the common factor dimensions are highly consistent with the preset latent variables, indicating that the data has high factor structure validity, and the scale design and data quality meet the basic requirements.

3 SETTING AND MODIFICATION OF STRUCTURAL EQUATION MODEL

In order to study the path relationship between residents' health awareness, health behavior and health satisfaction, we choose three latent variables, which are "health awareness", "health behavior" and "health satisfaction". "Health awareness" is reflected by five observable variables, "regimen", "epidemic prevention", "garbage classification", "quality of environment" and "food safety". "Healthy behavior" is reflected by three observable variables, "regular physical examination", "reasonable diet" and "regular fitness". "Health satisfaction" is reflected by two

observable variables, "perceived satisfaction" and "behavioral satisfaction". In this way, the study involves a total of 25 variables, including 10 observable variables and 15 unobservable variables (including 3 latent variables and 12 residual terms of endogenous variables). The hypothetical model setting is shown in Figure 1.

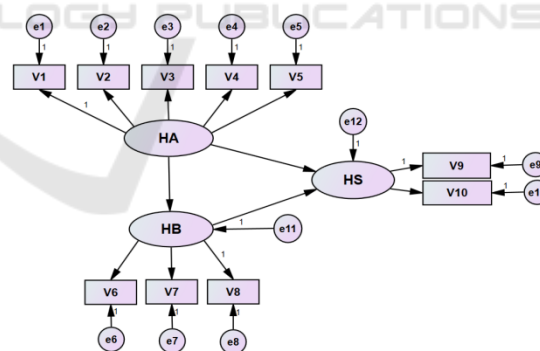


Figure 1: Hypothetical model of structural equation.

By fitting the hypothetical model with the sample data, the results show that the hypothetical model can converge and be identified. However, the fitting is poor, the chi square value is too large, and the p-value is too small, so the model needs to be further modified. According to the modification indices, the variance of e12 is found to be -0.018, so it is limited to 0 first. Further, it is found that there is a large covariant correlation between the six groups of residuals, such as e5 and e9, e2 and e4, e3 and e5, e8

and e10, e4 and e5, e4 and e9, so a two-way connection is established in sequence, and then the model is refitted and estimated. Finally, the model shows convergence, and the overall model fitness test statistic $\chi^2=37.398$, and the significance probability level, $p\text{-value}=0.088>0.05$, so the original hypothesis is accepted. In addition, the variance of each residual term in the model diagram of non standardized

estimated value is positive. In the model diagram of standardized estimation, each of the absolute value of standardized regression coefficient and correlation coefficient is not greater than 1. And the symbols are consistent with the theoretical expectation, indicating that the modified model can be adapted to the sample data. The modified model is shown in Figure 2.

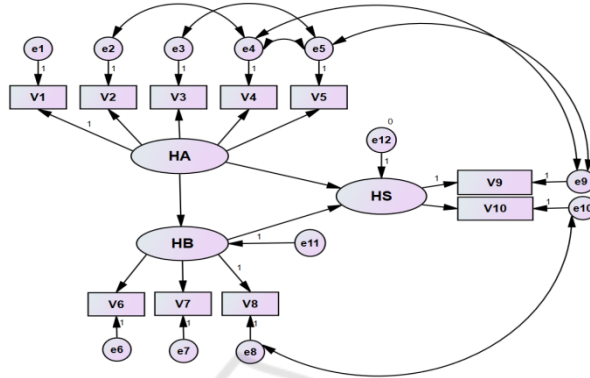


Figure 2: Modified model of structural equation.

Table 2 shows the summary table of the non standardized regression coefficient and its significance test. The first column is the non standardized regression coefficients, that is, the non standardized direct path coefficients. The second column is the standard error of the estimated parameters, and the third column is the test statistic

"critical ratio"(C.R.). If $C.R.>1.96$, it means that the regression coefficient reaches the significance level of 0.05. It can be seen from table 2 that only the second group is not very significant, and the p-values of other coefficients are all less than 0.001, indicating that the path coefficients of the model basically meet the significance level requirements.

Table 2: Summary of non standardized regression coefficient and its significance test.

			Estimate	S.E.	C.R.	P	Label
HB	<---	HA	.558	.041	13.669	***	Par-10
HS	<---	HA	.079	.104	.762	.146	Par-8
HS	<---	HB	.644	.173	3.727	***	Par-9
V1	<---	HA	1.000	-----	-----	-----	-----
V2	<---	HA	.513	.037	13.783	***	Par-1
V3	<---	HA	.517	.042	12.265	***	Par-2
V4	<---	HA	.477	.039	12.324	***	Par-3
V5	<---	HA	.531	.042	12.592	***	Par-4
V8	<---	HB	1.000	-----	-----	-----	-----
V7	<---	HB	.934	.063	14.809	***	Par-5
V6	<---	HB	.910	.068	13.321	***	Par-6
V10	<---	HS	1.262	.109	11.600	***	Par-7
V9	<---	HS	1.000	-----	-----	-----	-----

In the process of modification, covariance relationships between the six groups of residuals of e5 and e9, e2 and e4, e3 and e5, e8 and e10, e4 and e5, e4 and e9 are added in sequence. Table 3 shows the summary table of covariance and significance test between the above variables, and all correlation relationships are significant at the probability level of 0.05.

Table 3: Summary of residual covariance and its significance test.

	Estimate	S.E.	C.R.	P	Label
e5 <--- e9	.088	.019	4.614	***	Par-10
e3 <--- e5	.082	.020	4.040	***	Par-11
e2 <--- e4	.073	.016	4.547	***	Par-13
e4 <--- e5	.057	.017	3.292	***	Par-14
e4 <--- e9	.060	.017	3.543	***	Par-15
e8 <--- e10	.050	.018	2.836	.005	Par-16

Further, we evaluate the fitness indicators of the modified model. Table 4 and Table 5 show the output results of the model fitting indicators.

Table 4: Summary of model fitting indicators (1).

Indicator	Value	Critical value	Indicator	Value	Critical value
CMIN	37.398 (p=0.088)	p>0.05	RFI	0.969	>0.90
CMIN/DF	1.385	1-3	IFI	0.995	>0.90
RMR	0.015	<0.05	TLI (NNFI)	0.991	>0.90
RMSEA	0.026	<0.05	CFI	0.995	>0.90
GFI	0.987	>0.90	PNFI	0.589	>0.50
AGFI	0.973	>0.90	PCFI	0.597	>0.50
NFI	0.982	>0.90	-----	-----	-----

Table 5: Summary of model fitting indicators (2).

Model	NCP			ECVI	AIC	BIC	CAIC
	NCP	LO90	HI90				
Default model	10.398	.000	30.609	.167	93.398	214.631	242.631
Saturated model	.000	.000	.000	.196	110.000	348.135	403.135
Independence model	1984.329	1840.588	2135.425	3.660	2049.329	2092.626	2102.626

It can be seen from table 4 and table 5.

(1) The chi square degree of freedom ratio (CMIN/DF) of the model is between 1-3, and the fitting residual (RMR), progressive fitting residual (RMSEA), fitness index (GFI), adjusted fitness index (AGFI) and other fitting indicators meet the requirements.

(2) The non centralized parameter (NCP) is relatively small, and the 90% confidence interval contains 0.

(3) NFI, RFI, IFI, TLI, CFI and other fitting indicators are all above 0.90, and the two simplified adjustment fitting indicators (PNFI and PCFI) all reach 0.50, meeting the requirements.

(4) The expected cross validity Index (ECVI) of the modified model is smaller than that of the

saturated model and the independent model.

(5) The values of the three information standards, Akaike information criterion (AI), Bayesian information criterion (BIC) and the adjusted Akaike information criterion (CAIC) are smaller than those of the saturation model and the independent model.

In conclusion, all important evaluation indicators meet the requirements of the critical value reference standard, and it is judged that the modified model is well adapted, so the path analysis can be further carried out.

4 PATH ANALYSIS OF STRUCTURAL EQUATION MODEL

In order to compare the size of path coefficients between different variables, we use standardized path coefficients. Figure 3 shows the modified model marked with standardized direct path coefficients.

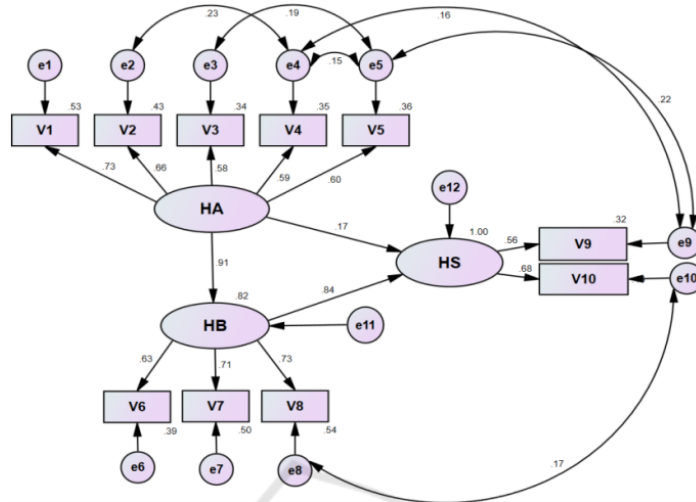


Figure 3: The modified structural equation model and its path coefficients.

Table 6 shows the comparison of standardized direct effect coefficients, indirect effect coefficients and total effect coefficients.

Table 6: Standardized direct coefficients, indirect coefficients and total effect coefficients.

Variable	Direct effect coefficient			Indirect effect coefficient			Total effect coefficient		
	HA	HB	HS	HA	HB	HS	HA	HB	HS
HB	.908	.000	.000	.000	.000	.000	.908	.000	.000
HS	.169	.844	.000	.766	.000	.000	.935	.844	.000
V9	.000	.000	.563	.527	.475	.000	.527	.475	.563
V10	.000	.000	.681	.637	.575	.000	.637	.575	.681
V6	.000	.628	.000	.570	.000	.000	.570	.628	.000
V7	.000	.707	.000	.642	.000	.000	.642	.707	.000
V8	.000	.732	.000	.665	.000	.000	.665	.732	.000
V5	.600	.000	.000	.000	.000	.000	.600	.000	.000
V4	.591	.000	.000	.000	.000	.000	.591	.000	.000
V3	.580	.000	.000	.000	.000	.000	.580	.000	.000
V2	.656	.000	.000	.000	.000	.000	.656	.000	.000
V1	.731	.000	.000	.000	.000	.000	.731	.000	.000

It can be seen from Figure 3 and Table 6 that among the five observable variables of the latent variable "health awareness"(HA), the most influential factor is "regimen"(V1), and the standardized path coefficient reaches 0.731, followed by "epidemic prevention"(V2), "food safety"(V5), "quality of environment"(V4) and "garbage classification"(V3), whose coefficients are all above 0.5. It shows that good health awareness are first reflected in people's attention to regimen, and then in people's attention to epidemic prevention and control, food safety, environmental quality and garbage classification.

Among the three observable variables of the latent variable "health behavior"(HB), the path coefficients from large to small are "regular fitness"(V8), "reasonable diet"(V7) and "regular physical examination"(V6), indicating that the health behavior of residents is first reflected in regular physical exercise, then in reasonable diet matching, and thirdly in regular physical examination every year.

Among the two observable variables of the latent variable "health satisfaction"(HS), the path coefficient of "behavior satisfaction"(V10) is significantly greater than that of "perceived

satisfaction"(V9), indicating that residents' cognition of health satisfaction mainly comes from the evaluation of their own health behavior, followed by the perception of personal health awareness.

Among the path relationships of the three latent variables, the direct effect of "health awareness"(HA) on "health behavior"(HB) is of decisive significance, with a coefficient as high as 0.908. "Health behavior"(HB) has a large direct effect on "health satisfaction"(HS), with a coefficient of 0.844. The direct effect of "health awareness"(HA) on "health satisfaction"(HS) is not high, the coefficient is only 0.169, and the statistical significance is not significant. However, through the intermediary variable "health behavior"(HB), the indirect path coefficient of "health awareness"(HA) on "health satisfaction"(HS) is 0.766, making the total effect as high as 0.935. So the influence is very obvious, which shows that people's perception of health satisfaction mainly comes from the evaluation of their own health behavior. Good health awareness must first act on people's own health behavior, and finally can truly improve personal health satisfaction.

5 CONCLUSIONS AND SUGGESTIONS

According to the path analysis of structural equation model, we draw the following conclusions.

(1) People's attention to regimen, epidemic prevention, garbage classification, environmental quality and food safety can be used as an effective observation of their health awareness.

(2) Regular fitness, reasonable diet and regular physical examination can reflect people's healthy behavior to a great extent.

(3) Health behavior has a strong direct effect on personal health satisfaction perception.

(4) The direct effect of health awareness on health satisfaction is relatively weak, but the indirect effect is very significant through the intermediary effect of the variable "health behavior".

(5) People's health awareness has a strong direct effect on health behavior.

Based on the above conclusions, we propose the following suggestions for the government and relevant management and service departments.

(1) Strengthen health publicity, regularly hold popular science lectures on health preservation, epidemic prevention and environmental protection through various channels, in order to improve people's health awareness.

(2) Further improve the medical and health service system, make it convenient for people to see a doctor, guide residents to pay attention to physical examination, and achieve "prevention before illness and prevention of change after illness".

(3) Strengthen the supervision of nutritional catering services, especially increase and improve the service quality of community canteens, further unblock the "vegetable through train" in the community, and provide convenience for people to have balanced nutrition and reasonable meals.

(4) Reasonably arrange sports and fitness venues, and add convenient sports facilities and places in communities and "pocket parks" to create a comfortable and convenient leisure and fitness environment for citizens.

FUND PROJECT

2020 research on the construction of first-class undergraduate major in Statistics (Project No.: 108051360022XN522)

REFERENCES

- Huang Huiqun. Research on influencing factors of online open courses based on structural equation model[J]. Journal of Guangxi normal university of science and technology, 2016,31 (5): 121-125.
- Liu Ying, Hao Yanhua, Sun Hong. Analysis on the current situation and influencing factors of college students' emergency knowledge level in Heilongjiang Province [J]. Chinese school health, 2015,36 (3): 330-332.
- Wu Hao, Qin Bo. Physical condition, safety awareness and residents' health consumption[J]. Consumer economy, 2015,31 (5): 41-7.
- Zhang Xiaoyan, Xiang Chen, Wang Qianyan. Analysis of incentive factors and countermeasures of family doctors based on structural equation [J]. China Health Administration, 2021,38 (6): 417-422.
- Zhang Mengqian, Wang Yancui. Improvement of family doctor system in China under the basic medical service system[J]. Medicine and society, 2018,31 (5): 4-7.