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Research on university student's network deviant behaviors based on structural equation model

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ABSTRACT: University students have formed a major part of network society. There're broad-range network deviant behaviors existing among those students. With the development of scientific technology, deviant behaviors are presenting new patterns and diversity. The main research method used for this problem is qualitative research. Therefore, this thesis applied structural equation model to conduct qualitative analysis on this problem by reasonably-designed questionnaire, so as to provide a scientific and objective research method based on effective data.

Keywords: structural equation model; university students; network deviant behaviors

1 INTRODUCTION

With the rapid development of economy and scientific technology, network has penetrated into all walks of society regardless of age, economic strength, vocation or usage of network. As the main part of network group, university students can leave impact on the advance of the society and themselves through each word and every conduct. Like another society, network also contains deviant behaviors and violations. However, due to the advantageous concealing nature of network, some immoral or irregular behaviors of university students cannot be effectively managed or restrained, leading to higher possibility of university student's deviant behaviors. Moreover, advance in scientific technology has resulted in new types of deviant behaviors with diversity. Therefore, under current new trend, study of university student's deviant behaviors contains fundamental importance in both theoretical and practical significance.

2 STRUCTURAL EQUATION MODEL

Structural model and measuring model are basic models of structural equation model, among which structural model only contains potential variables while measuring model contains both potential variables and observation variables. Hence, the main function of structural model is to illustrate internal relations among potential variables while that of measuring model is to illustrate the relations between potential variables and observation variables.

Steps to establish a model:

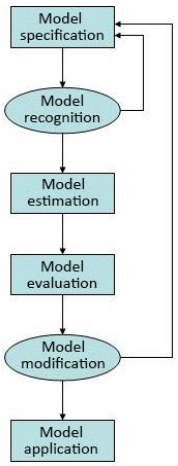

Figure 1. Steps to establish structural equation model

2.1 *Model specification*

Measuring model: a measuring model can be divided into:

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$y = \Lambda_y \eta + \varepsilon$ (endogenous variable equation)

$x = \Lambda_x \xi + \delta$ (exogenous variable equation)

In which, y and x respectively represent endogenous variable and exogenous variable. η and ξ respectively represent endogenous hidden variable and exogenous hidden variable. Λ_y and Λ_x are the error terms of coefficient matrixes ε and δ while it is required that four conditions must be met: no correlation with error of structural equation; no serial correlation; the mean values of the two must be zero and their variance must be constant; η and ξ are uncorrelated.

The key in verifying the model is to evaluate the significance level between validity and reliability of potential variable and observation variable with parameters.

Structural model: structural equation is

$$\eta = B\eta + \Gamma\xi + \varsigma$$

In which, ς refers to error. B and Γ refer to coefficient matrixes. The model requires ς shall meet three conditions: no correlation with ξ; the mean value is zero and variance is constant; and there's no serial correlation.

Hence, the equation of structural equation model is

$$y = \Lambda_y \eta + \varepsilon$$

$$x = \Lambda_x \xi + \delta$$

$$\eta = B\eta + \Gamma\xi + \varsigma$$

It can be used to evaluate the fitting level of the model; to calculate several dependent variables; and to deal with variable error.

2.2 *Model recognition*

This thesis applied t rule for recognition. If there are m exogenous observation variables and n endogenous variables in the structural equation model, there will be $\frac{1}{2}(m+n)(m+n+1)$ different errors and covariances. If there are t unknown free parameters, the degree of freedom $df = \frac{1}{2}(m+n)(m+n+1) - t$ needs to be bigger than 0, so as to make it possible for recognition. Therefore, t rule is

$$t < \frac{1}{2}(m+n)(m+n+1)$$

If $t > \frac{1}{2}(m+n)(m+n+1)$, it is unable to recognize the model. If $t = \frac{1}{2}(m+n)(m+n+1)$, the model is a saturated model. It is obvious that t cannot be bigger than $\frac{1}{2}(m+n)(m+n+1)$.

2.3 *Model estimation*

The aim of estimation is to reduce covariance matrix and lower the error of sample covariance. Commonly used methods include ML, DWLS, ULS, GIS and AFLS.

2.4 *Model evaluation*

The indexes and criterions of model evaluation are as follows:

Table 1. Evaluation indexes and criterions of structural equation model

Category	Statistical inspection amount	Criterion
Simple adaptation	*PGFI, PNFI*	>0.5
	CN	>200
	AIC, CAIC	Numerical value shall be as big as possible
Value-added adaptation	*NFI, RFI, IFI, TLI, CFI*	>0.9
Absolute adaptation	x^2	*p* value>0.05
	NC	*NC* >5, modify
	GFI, AGFI	>0.9
	RMR, SRMR	<0.05
	RMSEA	<0.08
	NCP, ECVI	Numerical value shall be as small as possible

2.5 *Model modification*

Commonly modification approach is to add or delete some parameters, variables, or paths, and change some free parameters into fixed ones. Or, some parameters can be changed with equal numerical values.

3 SCALE DESIGN AND DATA ANALYSIS

3.1 *Scale design*

The questionnaire used in this thesis was designed according to study requirement, industrial practice, normative language, and comprehensiveness of question, so as to ensure the scientific nature and correctness of the study. This thesis randomly selected 600 undergraduates from a comprehensive university as the study objects. Firstly, this thesis conducted a questionnaire survey. To ensure the scientific nature of data, the students were from four main majors including liberal arts, history, science, and engineering, evenly distributed from freshman to senior. The proportion between male students and female students is consistent while that between rural students and urban students is consistent. Explorative factor analysis was

conducted on these data. The questionnaire was modified and improved according to the analysis results. At last, the Scale Subjects shown as Table 2 was the final questionnaire.

Table 2. Scale subjects

Potential variables	Observation variables
Network pornographic behaviors	Browse erotic websites
	Post erotic information
Network usage deviant behaviors	Post harassment information on Wechat, QQ and Microblog
	Relieve anger through internet
	Internet fraud
	Fiddle with cellphone in class
	Spread other's private information
	Fiddle with cellphone before going to bed
	Buy lottery online
	Sell fake commodities online
	Buy illegal products online
	Get addicted to online games
	Get addicted to reading novels online
	Get addicted to watching videos online
	Online pyramid sales
	Virus making and dissemination
	Excessive consumption online
	Online plagiarism
	Participate in cyber manhunt
	Aimless commenting
Network speech deviant behaviors	Spread reactionary speech
	Spread false speech
	Verbal attack and insult others
Network dating deviant behaviors	Meet net friends
	Tell net friends bank account and other private information
	Share other's private information with net friends

This thesis applied 5-score scale to manifest the fitting level of network deviant behaviors happened among university students: 1 refers to "Do not match at all"; 2 refers to "Do not match"; 3 refers to "Match"; 4 refers to "Match well"; and 5 refers to "Can match very well".

3.2 *Reliability analysis*

This thesis applied Cronbach α coefficient to make reliability analysis, namely

$$\alpha = \frac{k}{k-1}(1-\sum\frac{S_i^2}{S_r^2})$$

In which, S_i^2 is the variance of the score got in No. *i* question. S_r^2 refers to the variance of all scores. *K* refers to the total number of questions. SPSS software was used to conduct the analysis. See Table 3 for the results.

It can be concluded from the above table that Cronbach α coefficients are all bigger than 0.7; and values of CITC are all above 0.5. Therefore, there's no uncorrelated factor in any variable. The internal consistency is very high, reflecting that the reliability of the data is high.

Hence, it can be well manifested that every measuring index of each study variable has high internal consistency. There's no uncorrelated factor in any index. The formal survey data has high reliability.

Table 3. Results of reliability analysis

Potential variables	Cronbach α coefficient	Observation variables	CITC
Network pornographic behaviors	0.852	Browse erotic websites	0.621
		Post erotic information	0.699
Network usage deviant behaviors	0.791	Post harassment information on Wechat, QQ and Microblog	0.748
		Relieve anger through internet	0.796
		Internet fraud	0.741
		Fiddle with cellphone in class	0.628
		Spread other's private information	0.623
		Fiddle with cellphone before going to bed	0.669
		Buy lottery online	0.749
		Sell fake commodities online	0.661
		Buy illegal products online	0.633
		Get addicted to online games	0.759
		Get addicted to reading novels online	0.661
		Get addicted to watching videos online	0.883
		Online pyramid sales	0.63
		Virus making and dissemination	0.808
		Excessive consumption online	0.605
		Online plagiarism	0.826
		Participate in cyber manhunt	0.727
		Aimless commenting	0.749
Network speech deviant behaviors	0.858	Spread reactionary speech	0.661
		Spread false speech	0.801
		Verbal attack and insult others	0.732
Network dating deviant behaviors	0.817	Meet net friends	0.779
		Tell net friends bank account and other private information	0.885
		Share other's private information with net friends	0.711

3.3 *Validity analysis*

This thesis conducted validity analysis by Bartlett sphere and KMO inspection. See Table 4 for the results.

It can be concluded from the above table that all KMO values are bigger than 0.5. Hence, there's no abnormal factor load and the internal consistence is high, showing the reliability of the data is high.

Table 4. Results of validity analysis

Potential variables	Bartlett	KMO	Observation variables	Factor load
Network pornographic behaviors	108.517	0.652	Browse erotic websites	0.729
			Post erotic information	0.758
Network usage deviant behaviors	4671.567	0.831	Post harassment information on Wechat, QQ and Microblog	0.647
			Relieve anger through internet	0.619
			Internet fraud	0.743
			Fiddle with cellphone in class	0.609
			Spread other's private information	0.776
			Fiddle with cellphone before going to bed	0.816
			Buy lottery online	0.82
			Sell fake commodities online	0.822
			Buy illegal products online	0.721
			Get addicted to online games	0.933
			Get addicted to reading novels online	0.844
			Get addicted to watching videos online	0.936
			Online pyramid sales	0.843
			Virus making and dissemination	0.299
			Excessive consumption online	0.771
			Online plagiarism	0.898
			Participate in cyber manhunt	0.811
			Aimless commenting	0.745
Network speech deviant behaviors	414.014	0.775	Spread reactionary speech	0.822
			Spread false speech	0.901
			Verbal attack and insult others	0.792
Network dating deviant behaviors	412.586	0.771	Meet net friends	0.844
			Tell net friends bank account and other private information	0.735
			Share other's private information with net friends	0.779

4 ANALYSIS OF STRUCTURAL EQUATION MODEL OF UNIVERSITY STUDENT'S NETWORK DEVIANT BEHAVIORS

4.1 *EFA (Exploratory Factor Analysis)*

This thesis had already conducted exploratory factor analysis through a survey while making the questionnaire. Then, it made corresponding modification and improvement on the questionnaire based on analysis conclusions. The final data obtained are scientific and reliable. Therefore, this thesis only needed to conduct confirmatory factor analysis on the data.

4.2 *CFA (Confirmatory Factor Analysis)*

In this phase, this thesis aimed to verify the fitting level of the model and tried to observe whether the factor quantity in observation variables can match factor load. At first, it applied PRELIS to treat coefficient matrixes and covariance matrixes. Then, it used LISREL software to generate the paths. See Table 5 for the results.

Table 5. Factor loading results of structural equation model

Browse erotic websites → Network pornographic behaviors	0.77
Post erotic information → Network pornographic behaviors	0.89
Post harassment information on Wechat, QQ and Microblog → Network usage deviant behaviors	0.78
Relieve anger through internet → Network usage deviant behaviors	0.71
Internet fraud → Network usage deviant behaviors	0.68
Fiddle with cellphone in class → Network usage deviant behaviors	0.85
Spread other's private information → Network usage deviant behaviors	0.91
Fiddle with cellphone before going to bed → Network usage deviant behaviors	0.79
Buy lottery online → Network usage deviant behaviors	0.75
Sell fake commodities online → Network usage deviant behaviors	0.77
Buy illegal products online → Network usage deviant behaviors	0.68
Get addicted to online games → Network usage deviant behaviors	0.77
Get addicted to reading novels online → Network usage deviant behaviors	0.82
Get addicted to watching videos online → Network usage deviant behaviors	0.78
Online pyramid sales → Network usage deviant behaviors	0.71
Virus making and dissemination→ Network usage deviant behaviors	0.54
Excessive consumption online → Network usage deviant behaviors	0.65
Online plagiarism → Network usage deviant behaviors	0.78
Participate in cyber manhunt → Network usage deviant behaviors	0.73
Aimless commenting → Network usage deviant behaviors	0.88
Spread reactionary speech → Network speech deviant behaviors	0.82
Spread false speech → Network speech deviant behaviors	0.76
Verbal attack and insult others → Network speech deviant behaviors	0.77
Meet net friends → Network dating deviant behaviors	0.81
Tell net friends bank account and other private information → Network dating deviant behaviors	0.75
Share other's private information with net friends → Network dating deviant behaviors	0.79

It can be known from the table above that all obtained data can meet the requirements of the study.

Table 6. Evaluation results

Evaluation index	PNFI	PGFI	CFI	NFI	IFI	TLI	x^2	RMSEA	AGFI	GFI
Index result	0.838	0.751	0.966	0.915	0.988	0.973	2.107	0.874	0.942	0.935
Acceptable range	>0.5	>0.5	>0.9	>0.9	>0.9	>0.9	<5	0.08~0.1	>0.9	>0.9

4.3 *Model modification and evaluation*

This thesis sued path analysis for modification. See the process shown as below:

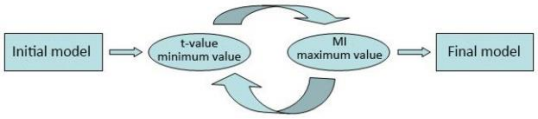

Figure 2. Map of modification process

Calculate T value at first and find the path of which the absolute value is lower than 1.96. Then, calculate MI value and modify paths with problems. The path diagram shown as below can be obtained by using LISREL software.

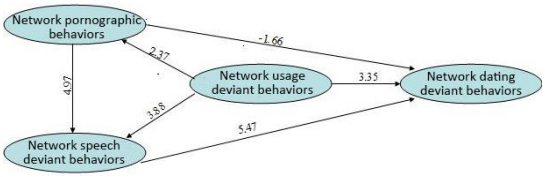

Figure 4. Path diagram

From Figure 3, it can be concluded that the absolute value of the path coefficient for network pornographic behaviors → network dating deviant behaviors is lower than 1.96. Hence, modification shown in Figure 4 is required.

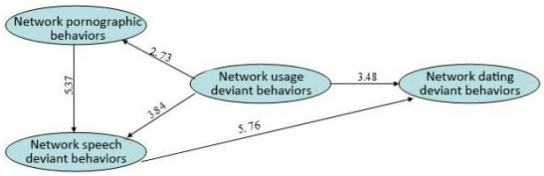

Figure 4. Modified path diagram

Then, this thesis evaluated the model according to simplicity fitting index, appreciation fitting index, and absolute fitting index. (See Table 6)

To sum up, the simplicity and fitting index of university student's network deviant behavior structural equation model is high. Therefore, this model is simple and has high fitting level.

5 CONCLUSIONS

This thesis established the structural equation model of university student's network deviant behaviors according to four variables: network dating deviant behaviors, network speech deviant behaviors, network usage deviant behaviors, and network pornographic behaviors. Based on reasonable design of the questionnaire, this thesis conducted reliability & validity analysis, exploratory & confirmatory factor analysis to ensure the scientific nature and reliability of the data. At last, this thesis reached the conclusion that the model is simple and has high fitting level based on the model establishment steps of the structural equation model.

REFERENCES

[1] Su, X. & Zhao, F.C. 2009. Research on structural equation model of university student's problem behaviors. *Journal of Liaocheng University (Natural Science Edition)*, 22(1): 105-107.

[2] Mao, X. 2014. Empirical research on university student's entrepreneurship cultivation based on structural equation model. *Journal of Chongqing Normal University (Natural Science Edition)*, 31(3): 135-139.

[3] Li, Z.L. 2006. *Structure of Structural Equation Model and Research on PLS Algorithm*. Wuhan: Wuhan University of Technology.

[4] Jiao, J.P. & Wang, D. 2013. Modification of university student's healthy life style evaluation scale based on structural equation model. *Chinese Journal of Health Statistics*, 30(5): 654-657.

[5] He, Y.Q., Bai, C.Q., Chen, C. & Ding, Y.F. 2015. Research on contemporary university student's graduation destination choice behavior based on structural equation model. *Mathematics in Practice and Theory*, 45(3): 22-29.

[6] Jiao, J.P. 2014. *Research on Influential Factors of Graduate's Healthy Life Style Based on Structural Equation Model*. Guangzhou: Southern Medical University.

[7] Zhou, W. & Zhou, J. 2009. Exploration on the influencing mechanism of university student's exercise behavior based on structural equation model. *Journal of Shandong Physical Education Institute*, 25(2): 57-60.