



# Influence Mechanism on Health Disparities Based on Brain Cognition, Mass Media and Life Style

Yaqing Chang

## ABSTRACT

Population health status is an important indicator of the economic and social development in a country. Based on the statistics of Chinese General Social Survey (CGSS2015), this paper analyzes the effects of mass media and life style on health through binary logistic regression analysis, and further studies the influence mechanism of brain cognition on health based on the literatures. According to the results of the study, mass media and life style have direct influences on health, and life style plays a mediating role between mass media and health; by contacting healthy information, brain cognition stimulates the consciousness and behaviours of the subjects, which affects the choices of life styles directly and leads to health disparities indirectly. The research conclusions provide practical basis for the development of healthy life styles and improvement of health conditions.

**Key Words:** Health Disparities, Mass Media, Life Style, Brain Cognition

**DOI Number:** 10.14704/nq.2018.16.6.1543

**NeuroQuantology 2018; 16(6):247-253**

## Introduction

Health is an essential issue related to the survival and development of human beings. With the frequent occurrence of global ecological crises, food safety issues and various diseases, human beings are exposed to more health risks, especially greenhouses microclimate which essential to maintain plant growing were destroyed, thus threatening the health of human (Bhoi, 2017; Mesoudi *et al.*, 2017), so population health issues are receiving great attention. Previous studies focused on the effects of biomedical factors, socioeconomic status and life style (Li, 2016; Ma, 2016; Phelan *et al.*, 1981; Wang, 2012; Engel, 1977; Zhang *et al.*, 2016) on health, which were of certain practical significance to improving human health. In recent years, mass media has been developing rapidly and gradually permeating people's daily life. It has been playing an increasingly important role in helping individuals receive health information through brain cognition and developing their healthy life styles.

According to the early studies of Trumbo (1995), media risk reporting is directly proportional to public concern. As the pioneer of the third scientific and technological revolution, the United States faced the impacts of modern life style on national health even earlier and attempted to handle health crisis with the help of modern media technologies at an early stage (Li, 2017). Chinese scholar Shou (2008) pointed out that people's health status is closely related to their life styles, and also closely related to the publicity they receive from various types of media. Media serves as a guiding role in fostering people's health awareness and civilized life style. Based on the MMN experiment, Yu *et al.*, (2010) preliminarily confirmed McLuhan's viewpoint, that "media is information". The media characteristics of the information dissemination channels influence people's cognitive preferences information processing methods and behaviours. Besides, by performed Neurofeedback training on

247

**Corresponding author:** Yaqing Chang

**Address:** Institute of Population, Hohai University, Nanjing 211100, China.

**e-mail** ✉ chang93237@163.com

**Relevant conflicts of interest/financial disclosures:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Received:** 1 March 2018 ; **Accepted:** 7 May 2018



overweight women can improve food craving and mental health (Fattahi *et al.*, 2017). Liu and Zhang *et al.* (2016) thought that the change of life style and the long-term high-fat and high-fructose diet may cause damages to the vital organs of the body and also result in brain cognition dysfunctions, thus affecting people's health status.

From the previous research results, it can be seen that the influencing factors to health are very complex. With the improvement of media technology and medical level, the comprehensive influence mechanism of mass media, life style and brain cognition on health disparities needs to be further studied. On the basis of existing researches, this paper conducts regression analysis on the social influencing factors to health disparities such as mass media and life style in China, and further discusses the relationships between brain cognition and mass media and life style and their influences on health. On the basis of empirical analysis, this paper explains the influence mechanism on health, which provides reference for the improvement of residents' health awareness and development of healthy life styles.

## Methods

### Data sources and statistical analysis

All data are from 2015 Chinese General Social Survey (CGSS2015). The survey was conducted among the total population in 28 provinces,

municipalities and autonomous regions across China using the multi-stage stratified sampling method, and a total of 10,968 urban and rural samples were collected, including 5544 female samples and 5134 male ones, with an average age of 50.39. After eliminating the missing values and invalid data of key variables, a total of 10363 valid samples were obtained. The descriptive statistics of main variables are shown in Table 1.

### Variable measurement

**Dependent variables:** residents' health disparities. Sociological research generally adopts the subjective health assessment methods, because self-rated health indicators comprehensively reflect the individual's physiological and psychological status and social adaptability, which constitute the overall health status of people and are important indicators of living quality (Lowry *et al.*, 2009). Therefore, this study uses the question "how do you describe your current health status" and combine the answer results into a binary variable "poor" (code 0) and "good" (code 1). According to the results, 39.6% of the respondents were in "poor" health and 60.4% were in "good" health.

**Independent variables:** Mass Media: the question "how often you used the following media in the past year", including six sub-items like newspaper, magazines, radio and television, was used for measurement. The exploratory factor analysis was performed on the 6 indicators

**Table 1.** Variable definitions and descriptive statistics (Unit: %)

Variables	Variable definition	Sample size	Mean /proportion
Gender	0=female, 1=male	5134	46.80
Average age	Continuous variable	10363	50.39
Marital status	1=single	1077	10.40
	2=married	8114	78.30
	3=Divorced	217	2.10
	4=widowed	963	9.30
Registered permanent residence	0=rural, 1=non-rural	3803	36.7
Education level	1= primary school and below	3896	37.60
	2= junior high school	2922	28.20
	3= senior high school	1865	18.0
	4= college degree and above	1678	16.20
Income	1= low income	2715	26.20
	2= low and middle income	3280	31.70
	3= middle and high income	1939	18.70
	4= high income	2429	23.40
Mass media	Newspapers, magazines, radio, television, internet, mobile phone customized messages (see Table 2)	10363	—
Life style	0=low participation in physical exercise	5439	70.50
	1=frequent participation in physical exercise	3057	29.50
Health disparities	0= poor health	4103	39.60
	1= good health	6259	60.40

Note: The differences between the sum of some variable samples and the total sample size are caused by missing values



**Table 2.** Factor analysis on mass media

Item	FAC1: Traditional media	FAC2: Modern media	Cumulative percent variance
Newspaper	.828	.195	.723
Magazines	.766	.374	.727
Radio	.673	.003	.453
Television	.444	-.469	.417
Internet (including mobile internet)	.175	.814	.694
Mobile phone customized messages	.204	.741	.417
Eigenvalue	1.994	1.611	3.605
Explained variance	33.235%	26.850%	60.085%

using the principal component analysis method. The Cronbach's Alpha coefficient was 0.625, indicating that the question had a high degree of internal consistency. After rotation by the maximum variance method, two common factors were extracted. The cumulative percent variance of the extraction sums of squared loadings was 60.09%. Therefore, these two common factors can well reflect most information of the original data. The factor analysis results are shown in Table 2.

Based on the output of Table 2, the comprehensive score of mass media can be analyzed using the variance contribution rate. The variance contribution rates of the two rotated common factors are 33.235% and 26.850%, respectively. The comprehensive score of mass media is calculated as follows:  $zF = 33.235\% * FAC1 + 26.850\% * FAC2$ . This study uses the comprehensive score of mass media to analyze the effects on residents' life style and health status.

life style: life style: measured with the question "did you often participate in physical exercise activities during your free time in the past year?". The answers were combined into two categories: "often" (code 1) and "seldom" (code 0). From Table 1, it can be seen that "seldom" accounted for the vast majority - 70.5%, and "often" accounted for only 29.5%.

Other variables: individual demographic features such as gender, age, marital status and registered permanent residence, etc. were used as control variables. Among them, female, married, rural registered permanent residence was considered as benchmark groups, with the value set to 0; age is a continuous variable; and education and income are treated as ordinal variables - primary school and below and low income are the benchmark groups, with their values set to 0. Based on the existing results of brain cognition, this paper takes brain cognition, mass media and life style all into consideration

and explores the intrinsic associations between the three and their influence mechanism on health.

### Analysis model

The independent variable "health status" in this study is a binary variable. Therefore, the binary Logistic regression model is used to analyze the influencing factors to residents' health status. When there are m independent variables, the binary Logistic estimation model is as follows:

$$P_i = \frac{1}{1 + e^{-(\alpha + \sum_{i=1}^m \beta_i x_i)}} = \frac{e^{\alpha + \sum_{i=1}^m \beta_i x_i}}{1 + e^{\alpha + \sum_{i=1}^m \beta_i x_i}} \quad (1)$$

$$\ln\left(\frac{P_i}{1 - P_i}\right) = \alpha + \sum_{i=1}^m \beta_i x_i \quad (2)$$

Where,  $P_i$  indicates the probability of good health status during the i-th observation. In the model,  $\alpha$  is the intercept item, m is the number of independent variables that affect residents' health status,  $\beta_i$  is the regression coefficient, which means, in the case that other variables are controlled, the odds ratio of good health and poor health will change by  $e^{\beta_i}$  units on average for every unit of change in  $x_i$ .

### Results

The software SPSS22.0 was used to analyze the influencing factors to residents' health. In order to compare the effects of multiple independent variables on health status, this paper establishes three basic models: the benchmark model (model 1); the mass media model (model 2), which adds the mass media variable based on the benchmark model; and life style model (model 3), which adds the life style variable based on benchmark model. The joint model (model 4), based on the benchmark model, includes both the mass media and life style variables (see Table 3).



**Table 3.** Logistic regression model for the influencing factors to health disparities of Chinese population

Variable	Model 1 Benchmark model	Model 2 Mass media model	Model 3 Life style model	model 4 Joint model
Gender	0.217*** (1.243)	0.212*** (1.236)	0.223*** (1.250)	0.218*** (1.243)
Age	-0.111*** (0.895)	-0.107*** (0.898)	-0.113*** (0.893)	-0.109*** (0.897)
Registered permanent residence	-0.044 (0.957)	-0.086 (0.918)	-0.067 (0.935)	-0.100+ (0.905)
Marital status Unmarried	-0.324** (0.723)	-0.333** (0.717)	-0.332** (0.718)	-0.340** (0.712)
Divorced	-0.420** (0.657)	-0.432** (0.649)	-0.416** (0.660)	-0.427** (0.652)
Widowed	-0.030 (0.970)	-0.008 (0.992)	-0.028 (0.972)	-0.008 (0.992)
Education Junior high school	0.135* (1.144)	0.084 (1.087)	0.112+ (1.118)	0.072 (1.074)
Senior high school	0.273*** (1.314)	0.175* (1.192)	0.243** (1.275)	0.163* (1.177)
College degree and above	0.380*** (1.462)	0.252** (1.287)	0.330*** (1.391)	0.228* (1.257)
Income Middle and low income	0.244** (1.276)	0.238** (1.268)	0.242** (1.274)	0.237** (1.268)
Middle and high income	0.434*** (1.543)	0.398*** (1.489)	0.420*** (1.521)	0.391*** (1.479)
High income	0.522*** (1.686)	0.461*** (1.586)	0.511*** (1.667)	0.460*** (1.583)
Mass media		0.286*** (1.331)		0.245*** (1.278)
Life style			0.217*** (1.242)	0.188*** (1.207)
Constant term	3.781***	3.744***	3.811***	3.797***
-2LL	12322.287	12264.401	12276.215	12223.496
Chi-square	1467.890***	1480.117***	1482.573***	1489.627***
Nagelkerke R <sup>2</sup>	0.180	0.182	0.183	0.184
Sample size	10242	10201	10220	10188

Note: figures in brackets are Exp(B); +P<0.1, \*p<0.05, \*\*p<0.01 and \*\*\*p<0.001

### Analysis on the influencing factors to residents' health disparities

From the perspective of control variables, in addition to registered permanent residence, the remaining variables have different degrees of influences on the population health. First of all, gender has a significant positive influence on health – male's health is significantly better than female's. Take model 1 for example. The probability of male being in good health is 1.234 times that of female (e0.217), indicating that there is a gender difference in population health, which is consistent with the existing research findings abroad (Cardano *et al.*, 2004). Second, age has a significant negative correlation with health in all models, indicating that as age grows, residents' health status gradually declines. Third, the regression coefficients of unmarried and divorced are negative, which means that the unmarried and divorced populations have much lower probabilities of being in good health than the married population. This is inconsistent with

the existing finding that unmarried people are more likely to be healthy (Chi, 2014), but confirms the view that marriage is good to the protection of health (Zeng *et al.*, 2004). Fourth, education can promote the health of residents, and the higher the education is, the more positive influence it will bring to health. As can be seen from model 1, 2, and 3, the probability of residents with college degree and above being in good health is 1.462 (e0.380), 1.287 (e0.252), and 1.391 (e0.330) times that of residents with primary school education or below. Finally, income has a significant positive impact on the health of residents, which verifies the view of social causation theory that the economic level of individuals can affect their health through various channels (Gravelle *et al.*, 2002).

In terms of the influence of mass media on health, in model 2, the more frequently the mass media is used, the chances are greater that the individuals will become healthier. Whenever the use frequency index of the mass media by an



individual is increased by one unit, the probability of such individual being in good health will be increased by 33.1%, indicating that mass media, as a platform for health information dissemination, has a strong explanatory power for the health of the population in China. As described by Rogers (1994): mass media transforms medical research findings into health knowledge that can be easily understood by the population, and reduces disease morbidity and mortality by changing their attitudes and behaviours, thereby effectively improving the quality of life and health standards in a country or region.

From the perspective of life style, the results of model 3 show that compared with people who do not often participate in physical exercise, those who often participate have much greater chances of being in good health (1.242 times) (e0.217). Therefore, physical exercise, as a healthy life style, has a significant positive influence on the health of residents, which is consistent with the existing research findings (Wang, 2012).

In model 4, the joint model adds both the mass media and life style variables. Although the significance of the model has not changed, the parameter estimation and goodness of fit of the model have changed, mainly reflected in the reduction of the mass media parameter, the unit that affect the changes in health status, and also the life style parameter. Through comprehensive

analysis of the two core independent variable models and the joint model, it can be seen that life style is a mediating variable between mass media and residents' health; in other words, mass media influences the health of population through life style (Wen *et al.*, 2012).

### Analysis on the influence mechanism of mass media on life style

According to the empirical analysis of the influencing factor models on population health disparities, mass media influences health through life style, but no research has examined the influence that mass media has on residents' life style. Therefore, this paper constructs a Logistic regression model for whether people often participate in physical activities (see Table 4) and discusses how mass media affects the life styles of Chinese residents.

From the statistical results in Table 4, it can be seen that whether people often participate in physical exercise activities is affected by many factors. There is a significant positive correlation between age and the frequency of participation in physical exercise activities, but it cannot be excluded that there is a U-shaped curve relationship between the two (Wang, 2012). Compared with the married population, unmarried people are more likely to participate in physical exercise activities - the probability is

**Table 4.** Logistic regression of Chinese residents' participation in physical exercise activities

Variable	Model		
	$\beta$	S.E.	Exp (B)
Gender	0.053	0.048	1.054
Age	0.046***	0.009	1.048
Registered permanent residence	0.380***	0.005	1.462
Marital status			
Unmarried	0.491***	0.098	1.633
Divorced	-0.089	0.156	0.915
Widowed	0.062	0.088	1.064
Education			
Junior high school	0.384***	0.067	1.468
Senior high school	0.492***	0.080	1.635
College degree and above	0.807***	0.095	2.242
Income			
Middle and low income	0.050	0.066	0.951
Middle and high income	0.145+	0.074	1.156
High income	0.157*	0.076	0.855
Mass media	0.970***	0.068	2.638
Constant term		3.163***	
-2LL		11379.527	
Chi-square		1013.841***	
Nagelkerke R <sup>2</sup>		0.135	
Sample size		10193	

Note: +P<0.1, \*p<0.05, \*\*p<0.01, and \*\*\*p<0.001



1.633 times that of the married people (e0.491). Education has a significant positive impact on people's participation in physical exercise activities. Compared with the residents with primary school education and below, those with junior high school and senior high school education and college degree or above have a higher chance of participating in physical exercise activities by 46.8%, 63.5%, and 2.242 times (e0.157), respectively. In terms of income, middle- and low-income population do not participate in physical exercise activities significantly more than low-income population, but middle- and high-income population participate more. In high income population, the income is negatively correlated with the participation rate.

Mass media has a significant influence on whether residents frequently participate in physical exercise activities, and the influence is positive. For each additional unit of the mass media index, the residents' chance of participating in physical activities increases by 163.8% (e0.970). This indicates that the more frequently an individual uses mass media, the more often such individual will participate in physical exercise activities. On one hand, people who often participate in physical exercise and chooses the healthy life style need the mass media to provide them with timely health information; on the other hand, people who often use mass media are more concerned with health risks and healthy life styles, so they will be more motivated to choose a healthy life style to improve their health status.

### **Influence mechanism of brain cognition on health**

The human brain serves as the basic element of media communication and is also the core organ of information cognition and processing. Joel & Saras (2008) from Iowa State University in U. S. used EEG to study the cognitive differences in readers when they read printed materials and CRT screen. Mass media, as an important medium for information dissemination, influences individuals' health awareness and behaviours through brain cognition. Wang (2016) based on the extension neural network found multi sensor information technology was vital important in information dissemination. Qi and Wang *et al.* (2017) pointed out that production noise interferes with the brain cognition behaviours and is the most harmful to workers. In addition to

the influences of external media on brain cognition and individual health, Yang and Huang *et al.* (2009) also found that appropriate physical activities can adjust the neuron activities related to cognition and improve brain cognition functions and thus promote human health. Wang (2017) researched on the effect of yoga on motor neuronal function recovery in stroke patients have shown that Yoga practice can improve the health and promote the recovery of neurological functions in patients effectively. Therefore, it can be seen that brain cognition, by contacting health information, stimulates the consciousness and behaviours of the subjects, which directly affects the choices of life styles and ultimately leads to health disparities.

### **Discussion and Conclusion**

This paper analyzes the effects of mass media and life style on health based on the statistics of Chinese General Social Survey (CGSS2015) and further studies the influence mechanism of brain cognition on health based on the literatures. According to the results of the study, (1) mass media has direct impact on the health of residents. The more frequently mass media is used, the healthier the residents will become. The mass media converts medical achievements to health knowledge that is easy for residents to understand, which contributes to improving the population health status. (2) Life style also has direct influences on the population health status. Frequent participation in physical exercise helps improve the residents' health. The more frequent their participation in physical exercise, the greater chances that their health will become better. (3) life style as a mediating variable and plays a mediating role between mass media and health; in other words, mass media influences residents' health status mainly through life style. (4) by contacting health information, brain cognition stimulates the consciousness and behaviours of the subjects, which affects the choices of life styles directly and leads to health disparities indirectly.

This study analyzes the influencing factors to residents' health status from the perspectives of mass media and life style. It finds out about the effects of the two on health and their influence mechanisms, but there are still some deficiencies. Frequent participation in physical activities is just one aspect of life style, and there are a series of other living habits (including both positive and risky behaviours to



health), which are not given enough attention. Due to the limited research data, this paper has not examined the influences of other aspects of life style on health and whether they are also the mediating mechanisms for mass media to affect health. This will be part of the follow-up studies in the future.

### Acknowledgements

This Study was Supported by Postgraduate Research & Practice Innovation Program of Jiangsu Province: Study on the social factors of longevity village and longevity (2017B737X14).

### References

- Bhoi AK. Classification and clustering of Parkinson's and healthy control gait dynamics using LDA and K-means. *International Journal Bioautomation* 2017; 21(1): 19-30.
- Cardano M, Costa G, Demaria M. Social mobility and health in the Turin longitudinal study. *Social Science and Medicine* 2004; 58(8): 1563-74.
- Chi SX. Social networks, psychological capital and health comparison of urban and rural residents. *Population and Development* 2014; 20(3): 96-103.
- Engel G. The need for a new medical model: a challenge for Bio-medicine. *Science* 1977; 196(4286): 129-36.
- Fattahi S, Naderi F, Asgari P, Ahadi H. Neuro-feedback training for overweight women: improvement of food craving and mental health. *NeuroQuantology* 2017; 15(2): 232-38.
- Gravelle H, Wildman J, Sutton M. Income inequality and health: what can we learn from aggregate data. *Social Science & Medicine* 2002; 54(4): 577-89 .
- Joel G, Saras B. Differences in brain information processing between print and computer screens: bottom-up and top-down attention factors. *International Journal of Advertising* 2008; 27(3): 399-423.
- Li J. Application of BP neural network algorithm in biomedical diagnostic analysis. *International Journal Bioautomation* 2016; 20(3): 417-26
- Li YQ. From mass media to social media: developing trend and enlightenment of health promotion based on mode on modern media in United States. *China Sport Science* 2017; 37(6): 52-61.
- Liu XB, Zhang WT, Guo R, Liu ZG. Recent advances in molecular mechanism research of high-fat and high-fructose diet induce cognitive loss. *Journal of Chinese Institute of Food Science and Technology* 2016; 16(10): 1-9.
- Lowry D, Yu X. Socioeconomic status and health differentials in China: convergence or divergence at old ages. *Population Studies Center, University of Michigan*, 2009.
- Ma L. Bare hands threshing stress analysis and bionics bare hand threshing device test, *Mathematical Modelling of Engineering Problems* 2016; 3(4): 171-74.
- Mesmoudi K, Meguellati K, Bournet PE. Thermal analysis of greenhouses installed under semi arid climate, *International Journal of Heat and Technology* 2017; 35(1): 474-86.
- Phelan JC, Link BG. Social conditions as fundamental causes of health inequalities: theory, evidence, and policy implications. *Journal of Health and Social Behavior* 2010; 51 (Suppl): S28-40.
- Qi ZQ, Wang H, Chang WW, Wang QX. The ERP analysis for the influence of industrial noise on brain cognition of workers. *Journal of Northeastern University (Natural Science)* 2017; 38(11): 1590-94.
- Rogers EM. The field of health communication today. *American Behavioral Scientist* 1994; 38(2): 208-15.
- Shou WH. The Influence of Media on Healthy Way of Life in Rural Areas. *Journal of Beijing Sport University* 2008; 31(3): 313-14.
- Trumbo C. Longitudinal modeling of public issues: an application of the agenda-setting processes to the issue of global warming. *Journalism and Mass communication Monographs* 1995; 8: 152-56.
- Wang F. Research on the effect of Yoga on the recovery of motor and neurological functions of stroke patients. *NeuroQuantology* 2017; 16(3): 35-40.
- Wang FQ. Socioeconomic status, Lifestyle and health inequality. *Chinese Journal of Sociology* 2012; 32(2): 125-43.
- Wang TC, Xie Y, Yan H. Research of multi sensor information fusion technology based on extension neural network. *Mathematical Modelling of Engineering Problems* 2016; 3(3): 129-34.
- Wen ZL, Liu HY, Hou JT. Regulation effect and mediation effect analysis. *Education science press* 2012; 2: 70-72.
- Yang ZQ, Huang T, Xu B, Liu DM. Research on the mechanism of brain cognitive function. *Journal of the Fourth Military Medical University* 2009; 30(22): 2693-95.
- Yu GM, Li B, Ding HQ, Wang F, Xu LJ. Medium is message: an empirical based on MMN-a comparative study of cognitive mechanisms on newspapers and electronic books. *Journal of International Communication* 2010; 32(11): 33-38.
- Zeng Y. Analysis of factors affecting health and longevity. *Beijing: Beijing University Press*, 2004; 5: 199-214.
- Zhang L, Zhang TD, Gao R, Tang DY, Yang JY, Fu TL, Zhan ZL. Phenol adsorption property of high specific surface areas biomass based porous carbon materials, *Mathematical Modelling of Engineering Problems* 2016; 3(4): 157-61.

