A Improved Statistical Model Analysis the Mental Health of Rural-to-Urban Migrants in China

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Abstract

The mental health of rural-to-urban migrants in China is a critical issue. The aim of this study was to test the migrants' mental health. The findings drawn from this qualitative study of 769 migrants in Wuhan in 2012 based on the Bayesian structural equation model. Overall, the survey found that leisure plays the greatest positive role in migrants' mental health, as well as work, interpersonal relationships, and health status have a negative role in migrants' mental health. Thus, the government must set relevant regulations to help migrants establish a better life and work values to work energetically.

Keywords: rural-to-urban migrants; mental health; Bayesian Structural Equation Model; work; leisure; health; interpersonal relationships

1. Introduction

China is an agricultural country, and farmers comprise more than 75% of the total population. A large number of farmers have poured into the cities over the past 30 years, which caused the rapid growth of the migrant population in China. The sixth census data released by the National Bureau of Statistics show that the number of migrants in China has reached 0.26 billion, which are the largest scale of labor migration in the history of mankind (CNBS, 2011). According to the National Bureau of Statistics, rural-to-urban migrants are those who migrate from the countryside to cities to seek more job opportunities and higher quality of life, but they have no permanent urban residency (CNBS, 2001). These migrants who migrated from rural to urban areas are affected by the limitations of the traditional urban–rural dual structure. Farmers can live and work in the cities, but they are not included in the city Hukou. Therefore, they are not included in the welfare and public distribution system of the city, and they do not enjoy the same treatment as the city residents in terms of labor and social security, health insurance, and children's education. They are the targets of social discrimination and are isolated in the edge of urban communities(Yang, Li, & Wang,2006; Wang *et al.*, 2010; McGuire, Li, & Wang, 2009), causing their mental health to become a common issue of concern.

The characteristics and demands of migrants have changed since China's 30-year economic reform. Young migrants occupy a large proportion of the total numbers (Liu,2007). This new generation of migrants usually aims for social mobility, with more prominent laddering migration characteristics. They are sensitive, self-recognized, and have a higher education level. They are different from their parents who are a tough breed and only pursue income. Young migrants aspire for a high quality of life and hope to enjoy the same social status as their peers in the cities. New factors may appear as migrants change in the 21st century.

2. Review of Literature

Several studies have been concerned about migrants' mental health. Lots of theories have explained factors that affect migrants' mental health. One of them is Cultural shock

theory. Some scholars have found that migrants'poor mental health may relate to their experience after migration. For the big differences between their own culture and the new place culture make them difficulty in adjusting the new life(Lee *et al.*, 2012; Anikeeva, 2010; Torres,2010; Thijs,2009; Bhugra & Gupta,2011). Another is Marginalization theory. Migrants are isolated in the edge of society, economy of cities, which worsen their mental health(Hiott *et al.*, 2008).The third is Ethnic density effect theory, which means the density of the migrants of the same race in the cities have much to do with their mental health(Veling *et al.*,2008; Das *et al.*,2010). The fourth is Gender difference theory. Different gender causes different mental health, and the female migrants' mental health is worse than the male(Del A.J. *et al.*, 2011; Nielsen & Smyth,2008). The fifth is Aim and age theory. If the migrants have comprehensive plan and clear objective of migration, then the older, the less mental health problems they have. So, the current study agrees with the assumption that traditional factors such as working environment, welfare system, and social support network affect the mental health of migrants. Moreover, quality of life is influenced directly or indirectly by the different elements of leisure(Iwasaki, 2007;Rodriguez *et al.*, 2008;Rodriguez, 2011;Wang *et al.*, 2011;Brajsa-Zganec, Merkas, & Sverko, 2011; Toepoel, 2012;Becchetti, Ricca, & Pelloni, 2012;Heo *et al.*, 2013;Lin, Wong, & Ho, 2013;Wang & Sunny Wong,2013;Haller, Hadler, & Kaup, 2013), so migrants' mental health may be influenced by the pursuit of the spiritual life.

Existing studies conducted in China investigated and analyzed mental health on urban and rural samples in different perspectives, such as gender, district, and type of migrant (Nielsen, Smyth, & Zhai, 2010; Zhu et al., 2011). A study by Shenzhen Health Institutes shows that the migrants' main mental health problems are mainly reflected in the following in descending order: emotional instability, mental pressure, income, nostalgia, marriage, social status, and so on (Mou *et al.*, 2013).

Firstly, the jobs and lifestyles of migrants are discriminated by citizens, and this situation affects their mental health. Most migrants from rural areas have low education and lack the necessary skills. Therefore, they can only engage in dirty and menial work. People in cities even think that they are more likely to be criminals. Migrants cannot integrate into the cities because they lack good health habits, and their way of life is despised by the city people (Lin *et al.*, 2011; Lei & Li, 2012; Zhang *et al.*, 2009; Mao & Zhao, 2012).

The lack of a social support network is also a factor that affects the mental health of migrants. According to Fei Xiaotong, China is an "acquaintance society." When we experience difficulty, we usually turn to our families and friends for help, but as migrants have lived in cities for only a short time, their scattered friends and relatives cannot form an effective social support network. When they experience problems, they are more likely to be frustrated and feel helpless (Wong & Leung, 2008; Chou, 2009; Qiu *et al.*, 2011; Lei *et al.*, 2012; Williams *et al.*, 1987).

Compared with the older migrants, the young have higher education and more engaged in the secondary industry and the third industry. They pursue higher level of enjoyment on matter and spirit. So leisure probably has linked to the mental health on contemporary migrants in China.

The aim of this study was to test the effects of work, leisure, health and interpersonal on rural-to-urban migrants' mental health in the urban–rural dual settings based on the Bayesian structural equation model. Furthermore, to prevent the ordered categorical variables as normal distribution variables from leading to wrong conclusions, we treat these variables as an implicit normal distribution with the threshold value. We present the methods and findings and discuss the implications of the findings for policies for strengthening migrants' mental health in China.

3. Methods

3.1. Sample

This paper is based on data collected in a broader study examining the mental health of migrants conducted in Wuhan in 2012. Wuhan, the megalopolis located in the lower-middle reaches of the Yangtze River, is the largest and the only sub-provincial city in Central China. The city covers an area of 8494.41 square kilometers. By the end of 2011, its total population was 10.02 million, among which were 2.2 million migrants.

Weemployed combined probability sampling with non-probability sampling methods. The respondents were migrants from the urban district of Wuhan. Random sampling was first used in the 13 municipal districts of Wuhan City, namely, Jiang'an, Jianghan, Qiaokou, Hanyang, Wuchang, Qingshan, Hongshan, Dongxihu, Hannan, Caidian, Jiangxia, Xinzhou, and Huangpi, to extract the three districts of Wuchang, Qingshan, and Hongshan. Accidental sampling was then used in vegetable markets, hotels, and construction sites in the three districts. The questionnaire has five aspects: the mental health of migrants in terms of work, leisure, health status, and interpersonal relationships as well as their basic information. Mental health that refers to leisure pertains to whether a person attends amusements events, leisure hours, elements that influence leisure, and future aspirations. Mental health that refers to health status pertains to whether a person visits a doctor when sick, the place where he/she obtain treatment, the reason a person did or did not choose a regular hospital, and the availability of reimbursement by work units. Mental health that refers to interpersonal relationships pertains to relationship with other people, homesickness, and performance when meeting difficulties and obtaining social satisfaction. The total Cronbach's coefficient of the entire questionnaire is 0.841, indicating high reliability.

In conducting the survey, we took the following factors into consideration: cost, feasibility, experience of past social investigations, and the fact that no respondent or no qualified respondent was found in the households. At the end, we collected 842 complete questionnaires in Wuhan. For this study, we excluded questionnaires where the data was incomplete; therefore, the sample for this study was 769 responses, which is equivalent to a 91.33% response rate.

3.2. Development and Validation of Measures

The structural equation model (SEM) is an extension of the general linear model in the following aspects. First, the SEM is suitable for multiple-reason analysis because it can deal with several dependent variables simultaneously. Second, it handles the measurement error from latent and observed variables. Third, it estimates the factor structure and factor relations simultaneously. Fourth, it enables greater flexibility in the measurement model. Fifth, the SEM estimates the parameters by a variance-covariance matrix to explore the true relationships among multivariables.

SEM with latent variables is routinely used in social science research. This model can be divided into measurement equation and structural (latent variable) equation. The former describes the relationship between the latent variables and the observable indicators, and the latter describes the relationship between latent variables.

In $i = 1, \cdots, n$, the measurement equation is expressed as $y_i = \Lambda \omega_i + \varepsilon_i$,

Where y_i is the observable random vector with dimensions $p \times 1$, Λ is the $p \times q$ factor loading matrix, and ω_i is the $q \times 1$ vector of the latent variable. Vector ε_i is the measurement error term, which is independent from ω_i, with dimensions $p \times 1$. We assumed that $\varepsilon_i \sim N[0, \Psi_\varepsilon]$, Ψ_ε is a diagonal matrix, and $\omega_i \sim N[0, \Phi]$, Φ is a positively definite covariance matrix.

The structural model is focused on studying the relationships among latent variables, η_i and ξ_i, which are computed by regressing the dependent vector, η_i, on the explanatory vector ξ_i as follows for $\omega_i = \left(\eta_i^T, \xi_i^T \right)^T : \eta_i = \Pi\,\eta_i + \Gamma\,\xi_i + \delta_i$, Where the $q_1 \times q_1$ matrix Π describes the relationships among latent variables in η_i. Clearly, the elements of the diagonal of Π are all zero. The $q_1 \times q_2$ matrix Γ quantifies the influence of ξ_i on η_i. The $q_1 \times 1$ vectors δ_i represent the unexplained parts of η_i. Under this parametrization, the measurement error vector ξ_i is assumed to be independently and normally distributed, and $\xi_i \sim N\,[0, \Phi]$, $\delta_i \sim N\,[0, \Psi_\delta]$, Ψ_δ is a diagonal matrix.

Several respondents might choose ends options in some questions, which could cause most of the variable histogram to be biased or bimodal. Processing the ordered categorical variables as normal distribution variables will lead to wrong conclusions (Olsson, 1979b; Lee, Poon, & Bentler, 1990a, 1990b; Li, 2011). A better option is to treat these variables as an implicit normal distribution with the threshold value(Geman & Geman,1984). The main idea of the Bayesian method is to treat the implied continuous measurement values as the hypothetical missing data before using the Gibbs sampling (Metropolis *et al.*, 1953) and MH calculation(Hastings,1970; Spiegelhalter *et al.*, 2003) to analyze the posterior distribution. Sampling from the posterior distribution of structural parameters, latent variables, and threshold values will obtain the unknown parameters, potential variables, threshold Bayesian evaluators, and standard deviation estimates.

In $v = \{ x, y \}$, $x = \{ x_1, \cdots, x_r \}$ is the continuous measurement, which is observable, $y = \{ y_1, \cdots, y_s \}$ is the implied consecutive measurement, which cannot be observed, and y is given from the classified variables, which is the observable and orderable $z = (z_1, \cdots, z_s)^T$. That is, $z = \begin{pmatrix} z_1 \\ \vdots \\ z_s \end{pmatrix}$, if $\begin{matrix} \alpha_{1,z_1} < y_1 \le \alpha_{1,z_1+1} \\ \vdots \\ \alpha_{s,z_s} < y_s \le \alpha_{s,z_s+1} \end{matrix}$, Where $k = 1, \cdots, s$, z_k is the integer with values that span from $\{ 0, 1, \cdots, b_k \}$, $\alpha_{k,0} < \alpha_{k,1} < \cdots \alpha_{k,b_k} < \alpha_{k,b_{k+1}}$.

For the posterior inference, we augmented the implicit and potential variables $[Y, \Omega]$ into observable variables $[X, Z]$, including a Gibbs sampling algorithm based on the general scheme $[\alpha, \theta, \Omega \mid X, Z]$. For the $(j+1)$ iteration, the number was $\alpha^{(j)}, \theta^{(j)}, \Omega^{(j)}$, and $Y^{(j)}$:

Sampling $\Omega^{(j+1)} \sim p\left(\Omega \mid \theta^{(j)}, \alpha^{(j)}, Y^{(j)}, X, Z \right)$;

Sampling $\theta^{(j+1)} \sim p\left(\theta \mid \Omega^{(j+1)}, \alpha^{(j)}, Y^{(j)}, X, Z \right)$;

Sampling $\left(\alpha^{(j+1)}, Y^{(j+1)} \right) \sim p\left(\alpha, Y \mid \theta^{(j+1)}, \Omega^{(j+1)}, X, Z \right)$.

We can select the threshold values from the frequencies of observable data and the standard normal distribution $N\,[0,1]$ (Lee,S.Y. & Song,X.Y., 2004).We define $\alpha_{k,1} = \Phi^{*-1}\left(f_{k,1}^* \right)$ and $\alpha_{k,b_k} = \Phi^{*-1}\left(f_{k,b_k}^* \right)$ for every k. $\Phi^{*-1}(\cdot)$ is the normally distributed $\Phi^{*-1}(\cdot) \sim N\,[0,1]$, and $f_{k,1}^*$ and f_{k,b_k}^* are the frequencies of the first category and the cumulative frequency of $z_k < b_k$, respectively.

3.3. Data Analysis

The SEM in this study have 20 observed variables, namely, marital status, age, educational background, frequency of working far away, working environment, job satisfaction, working hours, salary, leisure, future aspirations, elements affecting leisure, doctor visits, treatment location, reasons for not choosing a regular hospital, availability of reimbursement by work units, relationships with other people, homesickness, performance when meeting difficulties, and social satisfaction. The five latent variables in the model are mental health referring to work, leisure, health status, interpersonal relationships, and individuals basic information. Marital status, age, educational background, and frequency of working far away are the latent variables. Individual mental health (mental health referring to work, leisure, health status, and interpersonal relationships) is the result of the latent variables.

We set the threshold values to each observable ordinal categorical variable before calculating the model. The Bayesian computations were then made. We firstran two chains in parallel, and each chain were burned-in for 4000 iterations. Afterwards, we conducted 1000 more iterations as soon as the two chains converged. Thus, the results were calculated based on the final 2000 posterior samples. Moreover, thin=10 (random number should be extracted for every 10 times of posterior sampling) was established to overcome self-correlation.

The trace (burn-in of 4000 iterations) shows that the distribution of points did not change as the chain progressed. A linear or quadratic trend was not observed. These findings indicate that the chain is sufficiently mixed and stationary. The trace plots were omitted because of space constraints.

Table 1. Demographic Characteristics of Respondents

Variables	Item	Sample size	Frequency (%)
Gender	Male	318	44.35
	Female	399	55.65
Marital Status	Married	354	49.37
	Single	350	48.81
	Divorced and others	13	1.82
Age	Under 30	468	65.27
	Between 30 and 50	232	32.36
	Over 50	17	2.37
Educational background	Primary school and below	58	8.09
	Junior high school	352	49.09
	Senior high school and above	307	42.82
Registered permanent resident of Wuhan	Y	95	13.25
	N	622	86.75
Years of leaving home for business or work	1 to 5 years	349	48.68
	5 to 10 years	204	28.45
	10 to 15 years	89	12.41
	Over 15 years	75	10.46

Table 2. Posterior Estimation under the Bayesian Approach

Node	Mean	Sd	Node	Mean	Sd	Node	Mean	Sd
λ_1	-0.7973	0.0695	τ_1	-0.2774	0.1032	$\psi_{\varepsilon_{12}}$	1.2200	0.1132
λ_2	0.4717	0.0572	τ_2	1.0740	0.1638	$\psi_{\varepsilon_{13}}$	1.5630	0.1816
λ_3	0.3899	0.0631	τ_3	-0.0222	0.1625	$\psi_{\varepsilon_{14}}$	1.1970	0.1029
λ_4	1.0710	0.0852	τ_4	-0.0463	0.0322	$\psi_{\varepsilon_{15}}$	1.2170	0.2458
λ_5	-0.0666	0.0992	ψ_{ε_1}	2.4240	0.3511	$\psi_{\varepsilon_{16}}$	1.2140	0.1593

λ_6	0.1592	0.0612	ψ_{ε_2}	2.5280	0.3035	$\psi_{\varepsilon_{17}}$	0.8090	0.1201
λ_7	0.2939	0.0909	ψ_{ε_3}	1.3260	0.1406	$\psi_{\varepsilon_{18}}$	2.5310	0.2950
λ_8	1.0880	0.1040	ψ_{ε_4}	1.1140	0.1358	$\psi_{\varepsilon_{19}}$	0.0933	0.0131
λ_9	0.6994	0.1068	ψ_{ε_5}	2.6910	0.3545	$\psi_{\varepsilon_{20}}$	2.0110	0.1781
λ_{10}	0.6956	0.1061	ψ_{ε_6}	2.8170	0.3949	ψ_{δ}	1.5710	0.2152
λ_{11}	0.5717	0.1211	ψ_{ε_7}	1.0100	0.0972	$\phi_{\xi_{1,2}}$	-0.6428	0.2647
λ_{12}	0.5932	0.1004	ψ_{ε_8}	1.0220	0.0796	$\phi_{\xi_{1,3}}$	-1.2510	0.3326
λ_{13}	-0.6328	0.0390	ψ_{ε_9}	1.5250	0.1592	$\phi_{\xi_{1,4}}$	0.0393	0.0393
λ_{14}	1.5830	0.1618	$\psi_{\varepsilon_{10}}$	1.0440	0.1097	$\phi_{\xi_{2,3}}$	-1.9350	-1.9350
λ_{15}	-0.4877	0.0309	$\psi_{\varepsilon_{11}}$	1.7200	0.2316	$\phi_{\xi_{2,4}}$	0.0920	0.0920
						$\phi_{\xi_{3,4}}$	-0.1553	-0.1553
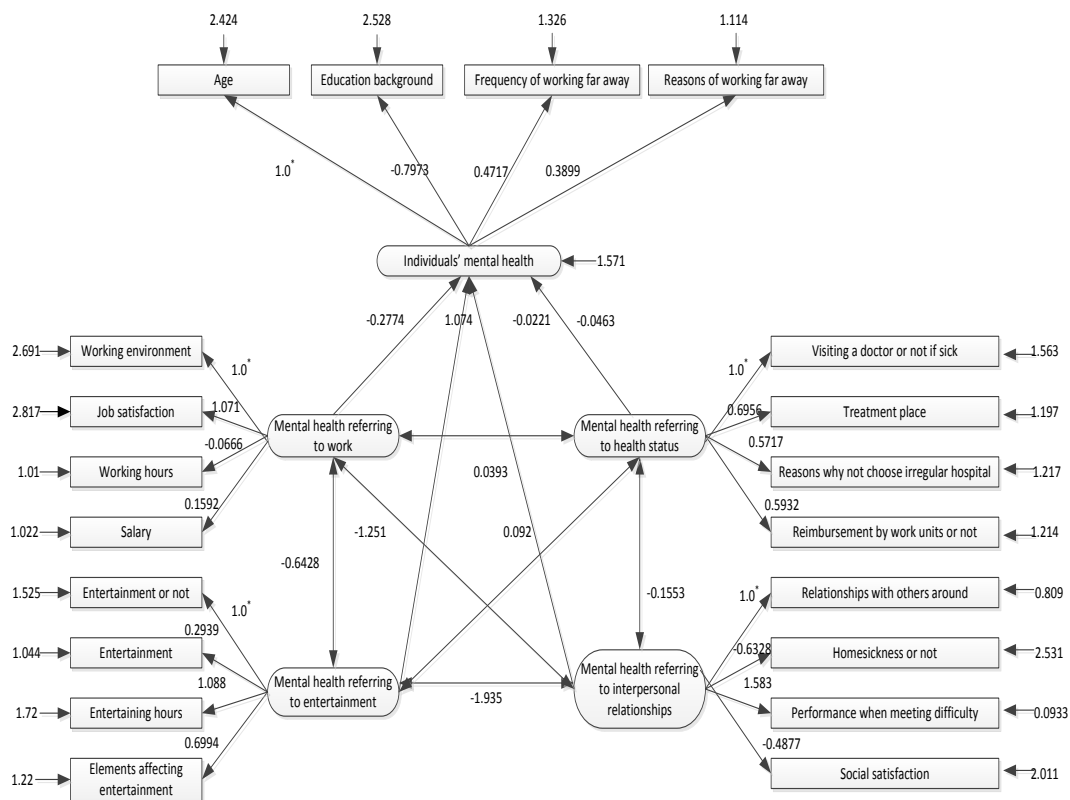
Figure 1. Path Diagram and Bayesian Estimation of the Parameters of Model

4. Findings

The majority of the respondents were female (55.65%). Young people below the age of 30 accounted for 65.27% of the total migrants. Their educational level was relatively high, and nearly 92% obtained junior high school or higher education. And the number of married is almost the same as the single. Only 13.25% respondents get registered permanent resident of Wuhan. 48.68% migrants were leaving home for business or work

for 1 to 5 years. Correspondingly, 10.46% were leaving home for business or work over 15years.

Table 1 presents the demographic and organizational behavioural characteristics of respondents. As shown, the proportion of younger migrants was higher than the olders, and the proportion of higher level education respondents was higher than the lowers. Furthermore, a smaller proportion of years of leaving home for business or work(10.46%) reported that the young migrants occupy a large proportion of the total numbers. In the current urban and rural dual environment, only a small number of migrants can get urban hukou and enjoy equal rights as city dwellers.

We conducted Bayesian structural equation model analysis with the influencing factors of mental health on migrants. As shown in Table 2 and Figure 1, the load factor of job satisfaction is maximum for the first latent variables(mental health referring to work), indicating that work satisfaction has a greater contribution to the first latent variable than working environment, salary, and working hours. Working hours has a negative effect on mental health referring to work. Leisure hours has a greater contribution to the second latent variables(mental health referring to leisure) than leisure and elements affecting leisure and activities. The observed variable of visiting a doctor when one is sick has greater influence on the third latent variables(mental health referring to health) than the other variables. The last variable, homesickness, has no influence on interpersonal relationships compared with social satisfaction, relationship with other people, and performance when meeting difficulty.

The structural equation that reflects the mental health referring to work, leisure, health status, and interpersonal relationships in model is expressed as

$$\eta = -0.2774\xi_1 + 1.074\xi_2 - 0.0222\xi_3 - 0.0463\xi_4$$

Therefore, mental health referring to leisure, with a coefficient of 1.074, has the greatest positive role in individual mental health. Specifically, one standard unit increases in mental health referring to leisure and population, which increases mental health at about the same amount. Conversely, mental health referring to work, interpersonal relationships, and health status has a negative role in individual mental health. The influence level follows the above-listed high-to-low sequence.

5. Discussion

The survey measured the mental health of migrants from four aspects: mental health referring to work, leisure, health status, and interpersonal relationships. These indicators not only reflect the cognitive process of migrants 'subjective emotions but also show the mental adaptation of "resocialization" in a new residence. In China, migrants are mainly from the rural areas, significant economic differences exist between rural and urban areas, we found the lack of leisure has the largest and most positive effect on the mental health of migrants in this study.

Considering their limited skills and education, large numbers of migrants from rural areas could only enter these labor-intensive enterprises where they work for long hours, earn low wages, suffer poor working conditions, and lack necessary safeguards. They have become the objects of these so-called sweatshops (Jiang, Talluri, & Yao, 2012). Most migrants work for over 40 hours; only a few migrants work for 40 hours or less. More than half of the migrants only receive 1500 to 3000yuan per month, and a small number of them earn more than 3000 yuan (Wong & Song, 2008). The middle-level income places heavy economic pressure on migrants. Some related studies show that low socio-economic status also causes mental health problems because being on the edge of the social structure system and receiving limited social and economic opportunities exacerbate their economic dilemma(Yang & Wang,2006; Dennis & Husseini,2004). New-generation migrants have higher requirements for life and bear more pressure, they need more leisure. To meet their own requirements, they have to seek relief. However, with the

economic and social development in China, migrants cannot resist the temptation of the many kinds of leisure.

To pursue the GDP growth, local governments look the other way when factories infringe on the rights and interests of workers. Moreover, trade unions in factories usually exist in name only, making it more difficult to protect workers (Rulliat, 2010). Migrants in these enterprises have nothing else other than their work. They have insufficient communication and leisure opportunities and live a suppressed life. Some young people could not bear that kind of life and would commit suicide, as evidenced in the 12 jump suicides that occurred in Shenzhen Foxconn in 2010(Cheng, Chen, & Paul,2011). Migrants under heavy work pressure are eager to obtain relief through leisure.

Leisure has become an important factor that affects the mental health of migrants. This factor is not only the result of the transformation of the current social situation in China but is also related to the microscopic characteristics of migrants. Leisure consumption is not merely an act but is more of a status symbol that carries social class, status, and taste of consumers. Migrants in cities are eager to strengthen the recognition of citizens, especially the middle-class status, through leisure. Although the economic foundation of migrants is not sufficient to bring them out of the edge of the city completely, the transition of their consumption modes indicates that they desire to get out of the edge and even become middle-class citizens. In China, migrants integrate into the city not through cultural identity but through status. Migrants, especially the new generation, usually take age groups in cities as reference. They imitate their consumption behaviors and are proud acquiring the same attitudes and behaviors as their urban peers. The new generation of migrant workers assesses their own consumption and lifequality by comparing themselves with others. China drew up labor regulations beforehand, but it did not appropriately define the new forms that harm the legitimate rights of workers. Thus, when these legitimate rights and interests are violated, it is difficult for migrants to use legal weapons to safeguard their rights.

Aside from being a reflection of identity, leisure consumption has become an important social intercourse function. Traditional social networks are broken after migration, and building a new social network to maintain a stable mental health has become a problem. Leisure consumption is a way of relieving work and life stress. It is also a way of social participation for building social networks. As they are affected by the biphasic effect of social discrimination and sense of belongingness, migrants establish homogeneous groups through leisure consumption. In this situation, a social support network is the spiritual and material pillar of a migrant's life. This intercourse is strengthened by leisure consumption among migrant colleagues as they become chatting and emotional communication partners, work affairs investigators, and allies when defending their rights and interests.

Acknowledgments

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