



The effect of health on urban-settlement intention of rural-urban migrants in China



Shenghua Xie^{a,*}, Jinxian Wang^b, Juan Chen^c, Veli-Matti Ritakallio^a

^a Department of Social Research, University of Turku, Assistentinkatu 7, Publicum 3rd Floor, 20500 Turku, Finland

^b Economics Department, Leiden University, PO Box 9520, 2300 RA Leiden, The Netherlands

^c Department of Applied Social Sciences, The Hong Kong Polytechnic University, GH305, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong

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ABSTRACT

Previous studies have not paid enough attention to the effect of health on urban-settlement intention of rural-urban migrants in China. Using survey data from the Rural Urban Migration in China project, this article examines how self-rated physical and mental health influence rural-urban migrants' intention to settle down in cities. First, the results show that both self-rated physical and mental health are significant factors influencing the migrants' intention to permanently move to cities. Second, the effect of physical health on rural-urban migrants' intentions to permanently reside in cities can be moderated by their length of urban residence. Third, the impact of health on rural-urban migrants' urban-settlement intention shows no generational differences. According to the research findings, this paper discusses how urban-settlement intention of rural-urban migrants based on health selection might impair urbanization, exacerbate health disparity between the rural and urban areas, and aggravate the burden on healthcare system in rural areas of China in the long run.

1. Introduction

Settlement intention refers to the willingness of individuals to reside in a place permanently. Recently, a large set of studies have been dedicated to exploring which factors influence the intention for rural-urban migrants in China to permanently settle down in cities (e.g. Cao et al., 2014; Connelly et al., 2011; Fan, 2011; Hao and Tang, 2015; Liu and Wang, 2014; Tan et al., 2015; Tang and Feng, 2015; Zhu, 2007; Zhu and Chen, 2010). Rural-urban migrants in China are those who work in urban areas, but their household registration (*hukou*) is registered in the countryside.¹ As the size of rural-urban migrants is estimated more than 200 million in 2014 (National Bureau of Statistics of China, 2015), how to design and implement appropriate policy measures to help rural-urban migrants settle down in cities is currently a prominent issue faced by scholars and policymakers alike (Tang and Feng, 2015).

The proportion of rural-urban migrants who have expressed the intention to permanently reside in cities has witnessed a rapid increase in recent years. To the best of our knowledge, Zhu (2007) published the first article about this subject, which was based on questionnaire survey

data in the Fujian province in 2002. He found that only about 21% of rural-urban migrants intended to permanently settle in cities. By 2006, this figure had increased to 35.8% (Zhu and Chen, 2010). Using survey data in Beijing in 2008, Fan (2011) discovered that approximately 30–40% of rural-urban migrants in Beijing expressed an intention to settle down permanently. More recent studies indicate that around 50% of rural-urban migrants were willing to settle down in cities as opposed to returning to rural areas (Cao et al., 2014; Gu and Ma, 2013; Liu and Wang, 2014; Tan et al., 2015; Tang and Feng, 2015). Increasingly, rural-urban migrants tend to stay in cities permanently under the rapid urbanization of China.

However, at present, little attention has been given to the association between health status and the urban-settlement intention of rural-urban migrants in China. This issue is remarkable because case studies outside of China have indicated that health status has significant effects on the intentions of rural-urban migrants to migrate and their decision to return. For instance, relevant studies on the health status of immigrants in developed countries have revealed the so-called “healthy migrant” paradox. This paradox refers to the fact that even though immigrants have relatively lower socioeconomic status (SES), their

* Corresponding author.

E-mail addresses: shexie@utu.fi (S. Xie), j.wang@law.leidenuniv.nl (J. Wang), juan.chen@polyu.edu.hk (J. Chen), vemari@utu.fi (V.-M. Ritakallio).

¹ The *hukou* system records the gender, date of birth, ethnicity, and home address of Chinese citizens. However, it also serves as a policy instrument for Chinese government to determine the social welfare entitlements of people such as government subsidy, medical services, and children's education. The relevant information of the *hukou* system has been documented in considerable literature (e.g. Chan, 2009, 2010; Solinger, 1999).

health (measured in terms of mortality, modality, heart disease, and chronic illness, etc.) is in better shape than the native-born population (Abraído-Lanza et al., 1999; Escobar et al., 2000; Fennelly, 2007; Franzini et al., 2001; Halliday and Kimmitt, 2008; McDonald and Kennedy, 2004). The “salmon bias” hypothesis, which aims to explain the “healthy migrant” phenomenon, suggests that migrants with poorer health have a higher probability of returning their places of origin than do migrants in better health (Abraído-Lanza et al., 1999; Halliday and Kimmitt, 2008; Sander, 2007). Such theories indicate that health status, as a crucial factor in migration, deserves more attention. Moreover, studies have also shown that health is a very important factor for the labor-market participation, income, and life satisfaction of individuals (Currier and Madrian, 1999; Qin et al., 2015; Strine et al., 2008). All these factors are significantly associated with the intentions of rural-urban migrants to live in cities (Cao et al., 2014; Tang and Feng, 2015; Zhu and Chen, 2010). Therefore, the role of health status in determining the urban-settlement intentions of rural-urban migrants calls for an empirical test.

Against this background, the aim of this research is to test how health status relates to the urban-settlement intentions of rural-urban migrants in China. In particular, this article draws on the healthy-migrant paradox and the “salmon bias” hypothesis to examine whether self-reported physical and health are associated with rural-urban migrants’ urban-settlement intentions. As such, this study deepens the understanding of the association between health and internal migration in developing countries theoretically and practically. So far, most studies on health and migration are based on international and internal migrants in developed countries; the Chinese case can enrich knowledge in this field. Further, this study contributes to existing literature by providing valuable policy suggestions on how to promote the rural-urban migrants’ urban integration in China.

2. Urban-settlement intention of rural-urban migrants

So far, existing research has mainly attributed institutional, demographic, and socioeconomic factors as the influencing factors in rural-urban migrants’ urban-settlement intentions (e.g. Cao et al., 2014; Connelly et al., 2011; Fan, 2011; Gu and Ma, 2013; Hao and Tang, 2015; Liu and Wang, 2014; Tan et al., 2015; Tang and Feng, 2015; Zhu and Chen, 2010). When it comes to institutional factors, the *hukou* system was once viewed as the fundamental barrier to the urban settlement of rural-urban migrants. This system excludes rural-urban migrants, the most vulnerable group in urban society, from the urban social service system, restricts their employment opportunities in the labor market, and results in identity discrimination against them (Fan, 2011; Nielsen and Smyth, 2008; Solinger, 1999). Thus, Fan (2011) highlights the need to reform the *hukou* system to create a fair labor market and better social future for rural-urban migrants to make it possible for them to permanently settle down in cities.

However, recent studies have shown that the importance of *hukou* in determining the urban settlement of rural-urban migrants has been decreasing (Chen and Fan, 2016; Zhu, 2007). This is reflected by the fact that the majority of rural-urban migrants do not want to convert their rural *hukou* to urban *hukou*; they, instead, want to keep their rural *hukou* but at the same time stay in the city to enjoy the benefits of the urban areas (Chen and Fan, 2016). This trend has changed the heretofore landscape in China’s migration system that the pathways for rural people to permanent urban settlement through *hukou* conversion once were very limited and valuable, such as entrance to college, joining the army, and recruited by governments or the state-owned enterprises (Cheng and Selden, 1994). Nowadays, rural-urban migrants can choose to permanently settle down in the city without changing their *hukou* status. The decreasing importance of the *hukou* system indicates that other factors must be considered when analyzing the determinants of rural-urban settlement of rural-urban migrants.

Regarding demographic attributes, previous studies have shown

that factors like gender, cohort, and marital status are significantly correlated with rural-urban migrants’ intentions of urban settlement (Connelly et al., 2011; Hao and Tang, 2015; Tang and Feng, 2015; Zhu and Chen, 2010). For example, Zhu and Chen (2010) found that female and younger rural-urban migrants have a stronger desire to settle down in cities than their counterparts. Some researchers emphasized the cohort differences in the urban-settlement intentions of rural-urban migrants and how the new-generation rural-urban migrants are found to have stronger intentions toward permanent urban settlement than the first-generation migrants (Hao and Tang, 2015; Tang and Feng, 2015).

Earlier research has also suggested that socioeconomic status (SES) positively relates to the urban-settlement intentions of rural-urban migrants (Cao et al., 2014; Hao and Tang, 2015; Liu and Wang, 2014). Rural-urban migrants who have higher educational attainments, higher income levels, and better occupations are less likely than those with lower SES to return to the countryside. Besides, rural-urban migrants with a permanent settlement intention are more likely to have positive opinions on local environments (Gu and Ma, 2013), become better integrated by building social relations with local urban residents and learning local dialects (Cao et al., 2014), and have less property in rural areas (Hao and Tang, 2015).

However, relatively less attention has been paid to the relationship between health status and rural-urban migrants’ urban-settlement intentions. Studies investigating how health status affects the migration intentions of rural-urban migrants did not distinguish the influence of physical health from that of mental health (e.g. Lu and Qin, 2014). Chen (2011) suggested that the physical and mental health of rural-urban migrants after migration have totally different trajectories, so it is worthwhile to take the two indicators into consideration simultaneously. Besides, many previous studies on the urban-settlement intentions of rural-urban migrants are based only on city-level or provincial-level survey data (e.g. Fan, 2011; Gao et al., 2012; Zhu, 2007; Zhu and Chen, 2010). In this paper, we extended the analysis to a larger number of cities across several provinces which cover the eastern, central, and western area of China.

3. Health, migration, and settlement

Health is significantly related to migration and settlement. The hypotheses proposed to explain the healthy-migrant paradox provide evidence to prove this correlation. The first hypothesis, called “selection of healthy migrants,” postulates that individuals with a better health status are more likely to migrate than those who are with poorer health (Chiswick et al., 2008; Halliday and Kimmitt, 2008; Jass and Massey, 2004). This hypothesis indicates that health is a very important factor affecting how individuals make decisions to emigrate. The second and most pervasive hypothesis is called “the salmon bias”. This one suggests that migrants with poorer health may choose to return to their country of origin while healthy migrants stay behind (Abraído-Lanza et al., 1999; Shai and Rosenwaike, 1987; Turra and Elo, 2009; Ullmann et al., 2011). This hypothesis reflects that health plays a crucial role in determining migrants’ settlement decisions.

To date, empirical validation of the selection of healthy migrants and the salmon bias hypothesis is still very sparse due to the difficulty of accessing health data of populations in their original places of emigration and tracking returning migrants. Palloni and Arias (2004) suggested that the healthy advantage of foreign-born Mexicans in the U.S. can be attributed to the salmon bias effect. Other studies, by contrast, provided weak or no evidence to support this hypothesis (e.g. Abraído-Lanza et al., 1999; Sander, 2007; Turra and Elo, 2009). Besides, some studies compared the health status of migrants who returned home and nonmigrants, but only found mixed results. For instance, Ullmann et al. (2011) found that the Mexican immigrants who returned home from the U.S. had a higher prevalence of some chronic diseases, such as obesity, smoking, or heart disease, than the



Fig. 1. The geographical distribution of sampled cities. Source: Meng et al. (2010b).

nonmigrants, but no differences were found in some other diseases, such as hypertension and diabetes, among the two groups of people.

There are also many studies that examined the health issues of rural-urban migrants. Some studies reported that immigrants have higher health risks because of lack of healthcare access, poor living and working environments, and a lack of social support (Gong et al., 2012; Hu et al., 2008a, 2008b). Based on household survey data from Beijing in 2009, Chen (2011) suggested that the healthy-migrant phenomenon existed only for the physical health of rural-urban migrants but not for the mental health of the immigrants, which is worse than the local urban citizens. Also, Lu and Qin (2014) compared self-rated health between returned immigrants and those who stayed behind, finding support for both the healthy-migrant paradox and the salmon bias hypothesis.

The above analysis suggests that health may also play a vital role in rural-urban migrants' urban-settlement intentions. First, the physical health of these rural-urban migrants strongly determines their employment and income (Giles and Mu, 2007; Qin et al., 2015). These socioeconomic factors are not only the main reason that they migrate to the city but also the precondition for them to settle down in cities permanently. The right to access the urban public healthcare system is also a factor that cannot be ignored. Since rural-urban migrants are excluded from the urban public healthcare service system because of the *hukou* system (Gong et al., 2012), if rural-urban migrants are in poor health, they may be forced to go back to the countryside to seek alternative healthcare services. Second, earlier studies have shown that rural-urban migrants are at high risk of mental health (Cheung, 2014; Lin et al., 2011). Factors such as discrimination, poor social capital, social stress, and work stress can also be risk factors in the mental health of rural-urban migrants (Cheung, 2014). If the migrants are under psychological stress, they may have less permanent settlement

intentions and choose to return to their places of origin because the social bonds of their original societies can reduce the mental stress that they suffer.

Moreover, because migration experience influences both the physical and mental health of rural-urban migrants (Chen, 2011; Gong et al., 2012; Hu et al., 2008a, 2008b), we could expect that the association between health and the urban-settlement intentions of rural-urban migrants may be moderated by their duration of stay in an urban setting. In addition, physical health and mental health may mutually affect each other. We, therefore, could hypothesize that the association between health and the urban-settlement intentions of rural-urban migrants might be jointly determined by the two health indicators.

Finally, rural-urban migrants have remarkable generational characteristics that cohort differences have played an important role in urban-settlement intentions of rural-urban migrants (Pun and Lu, 2010; Tang and Feng, 2015). Specifically, new-generation of rural-urban migrants are found to have stronger intentions toward permanent urban settlement than the first-generation migrants (Tang and Feng, 2015). Rural-urban migrants in different generations may also have differences in health conditions, which may affect their attitudes towards permanent urban settlement. Thus, we expect that the impacts of health on the urban-settlement intentions of rural-urban migrants in different generations may also be distinctive. The following sections will use the national survey data to test the above hypotheses.

4. Methods

4.1. Sample

We tested the above hypotheses using open-access survey data from

the Rural Urban Migration in China (RUMiC) project. This project is a national survey designed by a team of international researchers from China and Australia. It was implemented with support from the National Bureau of Statistics of China. This project aims to investigate income, social welfare, life quality, and other living conditions of rural-urban migrants. Most importantly, this survey provides the main source of their health status and their intention to stay in cities. Presently, the RUMiC database is one of the best national survey data on rural-urban migration in China (Gao et al., 2012).

The RUMiC project was conducted in 15 different cities distributed in nine provinces and municipalities of China in 2008 and 2009, respectively. As shown in Fig. 1, these cities cover the eastern, central, and western areas of China. Since most rural-urban migrants live near their workplaces, this survey used a workplace-based sampling method to choose respondents to reduce sampling errors (Meng, Kong, and Zhang, 2010).² More information on the design, sampling procedures, and methodology of this project has been documented elsewhere (e.g. Akgüç et al., 2014; Kong, 2010; Meng et al., 2010a, 2010b). The RUMiC survey interviewed 8446 and 5426 different rural-urban migrants in the two rounds of investigations, respectively. In this study, we restricted our research subjects to adult rural-urban migrants, so we excluded those migrants under 16 years of age in our sample. Also, according to the definition of rural-urban migrants, we deleted those who have urban *hukou* in our sample. To exclude the influence of outliers, we only included individuals who were wage earners with a monthly income above 200 *yuan* and below 20,000 *yuan* in our data analysis. Finally, we got a pooled dataset with 10,247 valid observations.

4.2. Measure

We used the urban-settlement intention to measure rural-urban migrants' attitudes toward urban settlement. In the RUMiC survey, rural-urban migrants were asked: "if policy allowed, how long would you like to stay in cities?" Responses were "1 year," "1–3 year," "more than 3 years," "permanently," and "not sure." We recoded responses into two categories (1 = permanently; 0 = others).

Two indicators were used to measure the health status of rural-urban migrants: self-rated physical health and mental health. Self-rated health is generally in line with objective outcomes of physical or mental health (Bound, 1991; Mossey and Shapiro, 1982). It is a good predictor of an individual's morbidity and mortality (McGee et al., 1999; Mossey and Shapiro, 1982). In this study, physical health was measured on a 5-point Likert scale by asking "how would you rate your current state of overall physical health?" Responses ranged from 1 to 5, representing "very poor," "poor," "fair," "good," and "excellent." As the percentage of rural-urban migrants who reported that their physical health was in "very poor" or "poor" categories was less than 2% in total, we constructed physical health as a binary variable. It was recoded into two categories: fair health or below (response = 1–3) and good health (response = 4–5).

Mental health was measured according to the General Health Questionnaire (GHQ-12) (Goldberg, 1978). This scale has been widely used to measure mental health of people (Jackson, 2006). It contained

12 items to measure rural-urban migrants' sleep quality, happiness, confidence, and self-worth among others (Appendix A Table A1). Responses ranged from 1 to 4, representing "no stress," "a little bit of stress," "fairly serious stress," and "very serious stress." The Cronbach's alpha of the scale was .82, suggesting a sound internal validity. The scores on the 12 items were added together, indicating mental stress of rural-urban migrants from a low level to a high level.

In addition to the indicators of health status of rural-urban migrants, we controlled a group of individual-level covariates in data analysis, including rural-urban migrants' demographic characteristics, socioeconomic factors, *hukou* status, and length of urban residence.

Demographic characteristics included gender, age, ethnicity, and marital status. Gender was a dichotomy (1 = male; 0 = female). Age was a continuous variable. Ethnicity was a dummy (1 = ethnic Han; 0 = minorities). Marital status was divided into two categories (1 = married; 0 = unmarried).

Socioeconomic status included education, income, job contract, occupation, employer industry, and dwelling ownership. Education was structured based on the educational attainment of rural-urban migrants. It was divided into four types: primary education or below, middle school education, high school education, and university education or above. Income was structured based on the monthly income of rural-urban migrants. For the purpose of comparison, it was coded into four levels: less than 1000 *yuan*, 1000–2000 *yuan*, 2000–3000 *yuan*, and above 3000 *yuan*. Rural-urban migrants' job contract included two categories (1 = having contract; 0 = no contract). According to Cao et al. (2014), self-employed rural-urban migrants have a stronger desire to establish permanent settlement. We coded occupation into two types (1 = self-employed and 0 = others). In agreement with National Bureau of Statistics of China (2015), we divided the working industries into seven categories: (1) construction; (2) manufacturing; (3) transportation, warehousing and postal industry; (4) accommodation and catering; (5) wholesale and retail; (6) service industry; and (7) other industries. Following Liu and Wang (2014), we divided dwelling ownership into two categories (1 = self-owned; 0 = others).

Hukou status was divided into two categories: local *hukou* and nonlocal *hukou* (1 = local *hukou*; 0 = nonlocal *hukou*). Rural-urban migrants with local *hukou* mean that they migrate within the prefecture where their *hukou* is registered, while rural-urban migrants with nonlocal *hukou* migrate out of the prefecture where their *hukou* is registered. Finally, length of urban residence was measured by how many years rural-urban migrants have lived in cities, which was a continuous variable.

4.3. Statistical methods

We used the logistic regression model to examine the relationship between health and the urban-settlement intentions of rural-urban migrants. We first tested how physical and mental health affect rural-urban migrants' urban settlement after controlling for demographic characteristics, socioeconomic factors, *hukou* status, and length of urban residence. We then tested whether the impacts of physical and mental health on rural-urban migrants' urban-settlement intentions are independent of each other by including the interaction term of the two health indicators into the regression model. Next, we examined if the influence of health status on rural-urban migrants' urban-settlement intentions could be moderated by migration experience. Finally, we also grouped the pooled data into subsamples by generation to test if the influence of health status on urban-settlement intention was distinctive in different generations of rural-urban migrants. In academia, rural-urban migrants in China are often categorized into two generations: first-generation and new-generation migrants (Hao and Tang, 2015; Liu et al., 2012; Pun and Lu, 2010; Tang and Feng, 2015). New-generation migrants refer to those who were born after 1980, raised up in either countryside or cities, and registered as temporary residents in urban society. First-generation migrants are those mi-

² The RUMiC researchers argue that previous surveys are normally based on rural-urban migrants' current residential address. However, in practice, many of them do not register with local authorities as temporary residents but just live at their workplaces without any formal residential address. Therefore, existing surveys would not be able to capture those unregistered migrants if they only use administrative records of rural-urban migrants' residential addresses as the basis of sampling frame. In order to resolve the issues caused by residential address-based sampling, the RUMiC researchers, instead, used a name list containing the workplaces of each sampling city. They recorded the total number of rural-urban migrants in each workplace and used the recorded information as the sampling frame for subsequent random sampling. This is the reason why the RUMiC is called as a workplace-based survey. More information has been documented in other literature (Kong, 2010; Meng et al., 2010a, 2010b).

Table 1
Descriptive statistics.

Variables	Range	Mean/percentage
Urban-settlement intention (%)		
Permanent	0,1	60.71
Others	0,1	39.29
Gender (%)		
Male	0,1	59.85
Female	0,1	40.15
Age (SD)	16–60	31.10 (10.01)
Marital status (%)		
Married	0,1	62.12
Unmarried	0,1	37.88
Ethnicity (%)		
Ethnic Han	0,1	98.43
Minorities	0,1	1.57
Education (%)		
Primary education and below	0,1	12.37
Middle school education	0,1	48.94
High school education	0,1	33.13
University education or above	0,1	5.56
Income (SD)	200–18500	1642.74 (1069.53)
Labor contract (%)		
Having contract	0,1	50.01
No contract	0,1	49.99
Work industry (%)		
Construction	0,1	10.18
Manufacturing	0,1	20.36
Transportation, warehouse, and wholesale	0,1	2.94
Wholesale and retail	0,1	27.03
Accommodation and catering	0,1	18.52
Service industry	0,1	15.86
Others	0,1	5.11
Occupation (%)		
Self-employed	0,1	35.83
Others	0,1	64.17
Dwelling ownership		
Self-owned	0,1	3.55
Others	0,1	96.45
Hukou status (%)		
Local hukou	0,1	17.65
Non-local hukou	0,1	82.35
Length of urban residence (SD)	.5–44	7.86 (6.41)
Physical health (%)		
Good physical health	0,1	84.54
Fair health or below	0,1	15.46
Mental stress (SD)	12–44	19.59 (4.48)

SD represents standard deviation.

grants who were born before 1980. We also used this standard to categorize rural-urban migrants in our data.

Additionally, since the mental health variable has 1444 missing observations in the dataset, we used mi impute regress in Stata 14.0 to fill in the missing values. Also, because the survey data was collected from 15 cities in 2 years, we controlled the city-fixed effects and year dummies when running regression models.

5. Results

5.1. Descriptive statistics

Table 1 shows the descriptive statistics. Overall, approximately 61% of rural-urban migrants intend to permanently reside in cities, which is very close to the finding of Tan et al. (2015) but higher than the result of most earlier studies. The reason that the percentage of rural-urban migrants who intend to permanently settle down in cities is higher than the finding of most previous studies may be that in the RUMiC survey, the question to measure urban-settlement intention of rural-urban migrants was set with the premise of “if policy allowed.” This premise means that rural-urban migrants only need to answer their attitudes toward urban settlement without considering policy restrictions like the hukou system. Consequently, more migrants would like to express

their intention to permanently settle in cities.

The descriptive statistics show that 86% of rural-urban migrants are in good physical health condition, while 15.46% are in fair or below physical health conditions. The average mental stress of rural-urban migrants is 19.59, indicating that, in general, rural-urban migrants' mental health is not poor.

Nearly 60% of rural-urban migrants are male. The average age of rural-urban migrants is 31.10 years. About 62% of rural-urban migrants are married, and more than 98% are ethnic Han. In general, the educational attainment of rural-urban migrants is low. More than 60% have only a middle school education or below that, and those who have a university education and above is less than 6%. The average income of rural-urban migrants is about 1642 *yuan* per month. Notably, nearly half of rural-urban migrants do not have labor contracts, indicating poor labor protection in Chinese cities. Approximately 36% of rural-urban migrants are self-employed. The proportions of rural-urban migrants in seven employment industries are as follows: construction (10.18%), manufacturing (20.36%), transportation, warehousing and postal industry (2.94%), accommodation and catering (27.03%), wholesale and retail (18.52%), service industry (15.86%), and other industries (5.11%), respectively. Only about 4% of rural-urban migrants have own housing, suggesting the housing poverty of them. Less than 18% of rural-urban migrants are intra-prefecture migrants, meaning that the vast majority of the rural-urban migrants move far away from their original homes. In our sample, rural-urban migrants have an average of 7.85 years of urban stay.

5.2. Regression results

Table 2 presents the regression results on the relationship between health status and the urban-settlement intentions of rural-urban migrants. Model 1 shows that gender and marital status are not significantly correlated with rural-urban migrants' urban-settlement intentions. However, ethnicity shows a significant correlation with it. The predicted odds of ethnic Han to permanently reside in cities are 49% ($e^{0.3982}-1$) higher than that of their minority counterparts. Interestingly, the correlation between age and urban-settlement intention shows an inverted U-shaped curve. That is, while age shows a positive correlation with rural-urban migrants' urban-settlement intention, the age-squared displays a negative correlation with it. Based on the equation $X = -\beta_1/2\beta_2$, rural-urban migrants' urban-settlement intentions reaches the highest point at the age of 42 ($-.0417/2*(-.0005)$). After this age, their urban-settlement intentions start to decrease.

Socioeconomic factors are significantly associated with rural-urban migrants' urban-settlement intentions. Compared to rural-urban migrants with a primary education or below that, migrants with a university education are more likely to settle down in cities, but migrants with a middle school or high school education show no higher intention of urban settlement than migrants with a primary education or below that. In comparison with rural-urban migrants who make less than 1000 *yuan* per month, those with a higher level of income tend to express stronger intentions to permanently reside in cities. Those rural-urban migrants who have a job contract are also more likely to permanently settle down in cities. In line with the study of Cao et al. (2014), self-employed rural-urban migrants show stronger urban-settlement intentions than migrants in other occupations. Noticeably, among rural-urban migrants working in all industries, those who work in the construction industry have the weakest urban-settlement intentions. In addition, rural-urban migrants who have self-owned housing have stronger intentions of urban-settlement, which is consistent with the finding of Liu and Wang (2014).

A quadratic association between urban-settlement intention and length of residence was also found, meaning that the pattern between urban-settlement intention and duration of urban stay is an inverted U-shaped curve. Moreover, the intercounty migrants are less likely to

settle down in cities permanently than the intracounty migrants. One reason might be that *hukou* status plays an important role in determining rural-urban migrants' urban-settlement intentions. This result is consistent with the finding of Fan (2011).

Model 2 shows that after controlling for other covariates, physical health is a crucial determinant of rural-urban migrants' urban-settlement intentions. Compared to rural-urban migrants with fair or below physical health, for rural-urban migrants with good physical health condition, the odds for them to have permanent urban-settlement intentions is 27% greater ($e^{0.2407} - 1$). Model 3 shows that for every one level increase in mental stress, the odds of rural-urban migrants' permanent urban-settlement intentions decrease about 3% ($1 - e^{-0.0268}$). This result means that mental health is also a vital determinant of rural-urban migrants' urban-settlement intentions. Furthermore, the results are robust, either controlling physical and mental health separately (model 2 and model 3) or jointly (model 4).

In the following step, we tested whether length of urban residence moderates the effects of health status on rural-urban migrants' urban-settlement intentions. We used a stepwise strategy to add interaction terms between health status and length of urban residence into the regression model to avoid excessive multicollinearity. The results are reported in Table 3. The results suggest that while duration of urban stay does not moderate the effect of mental health on rural-urban migrants' urban-settlement intentions (model 2), it somewhat moderates the impact of physical health (model 1). Both the main effect of physical health and its interaction with the length of urban residence

come statistically significant. Fig. 2 shows how the effect of physical health on intentions of urban-settlement depends on the length of urban residence. We also tested if there is an interaction effect between physical and mental health on rural-urban migrants' urban-settlement intentions. Model 3 shows that although the main effect of mental health is still significant, the effects of interaction term and physical health are not significant. This result suggests that the urban-settlement intentions of rural-urban migrants are not jointly determined by the two health indicators. Besides, the results may also indicate that mental health is probably a more crucial health indicator than physical health in affecting the intentions of rural-urban migrants to settle down in cities.

To test if the effects of health on rural-urban migrants' urban-settlement intentions have any differences in different generations of rural-urban migrants, we grouped the pooled data into separate datasets by generation. The results suggest that the relationships between health status and rural-urban migrants' urban-settlement intentions are robust among both first-generation migrants and new-generation migrants (see Appendix A Table A2). Furthermore, the impacts of physical and mental health on urban-settlement intention show no generational differences. Neither the interaction term between physical health and generation nor the interaction term between mental health and generation is statistically significant (model 3 and model 4). This result means that health is the same important factor influencing urban-settlement intention of rural-urban migrants in two generations.

Table 2
Logistic regression on the effects of health status on urban-settlement intention of rural-urban migrants.

	Model 1		Model 2		Model 3		Model 4	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Constant	-1.4441***	.3917	-1.6449***	.3946	-.9565*	.4022	-1.1635**	.4079
Gender (ref. male)	.0178	.0468	.0211	.0468	.0430	.0471	.0429	.0471
Age	.0424*	.0183	.0411*	.0183	.0428*	.0183	.0417*	.0183
Age squared	-.0005*	.0002	-.0005*	.0002	-.0005*	.0002	-.0005*	.0002
Marital status (ref. married)	-.0261	.0714	-.0281	.0714	-.0098	.0716	-.0130	.0716
Ethnicity (ref. minorities)	.3982*	.1676	.4038*	.1662	.3972*	.1671	.4015*	.1660
Education (ref. primary education and below)								
Middle school education	.0921	.0710	.0804	.0711	.0812	.0713	.0734	.0714
High school education	.0326	.0764	.0210	.0766	.0117	.0768	.0051	.0769
University education or above	.3420**	.1172	.3261**	.1175	.3109**	.1174	.3020**	.1176
Income (ref. Less than 1000 yuan)								
1000–2000 yuan	.1698**	.0632	.1651**	.0633	.1618*	.0634	.1591*	.0634
2000–3000 yuan	.2243**	.0789	.2146**	.0789	.2001*	.0791	.1951*	.0792
More than 3000 yuan	.4921***	.0962	.4801***	.0963	.4600***	.0966	.4540***	.0967
Labor contract (ref. no contract)	.2061***	.0502	.1957***	.0503	.1957***	.0503	.1888***	.0504
Work industry (ref. construction)								
Manufacturing	.4199***	.0867	.4184***	.0868	.4206***	.0871	.4194***	.0871
Transportation, warehouse, and wholesale	.4554***	.1419	.4495**	.1421	.4431**	.1422	.4397**	.1423
Wholesale and retail	.6213***	.0838	.6211***	.0839	.6257***	.0840	.6252***	.0841
Accommodation and catering	.4621***	.0871	.4715***	.0873	.4680***	.0876	.4748***	.0877
Service industry	.4411***	.0876	.4505***	.0877	.4518***	.0880	.4581***	.0881
Others	.3428**	.1165	.3528**	.1165	.3598**	.1163	.3657**	.1163
Self-employed (ref. others)	.1843***	.0535	.1821***	.0535	.1836***	.0536	.1821***	.0536
Dwelling ownership (ref. others)	.9115***	.1498	.9118***	.1501	.9015***	.1499	.9029***	.1501
Hukou status (ref. local hukou)	-.2236**	.0708	-.2239**	.0708	-.2235**	.0709	-.2237**	.0709
Length of urban residence	.0475***	.0111	.0486***	.0111	.0499***	.0111	.0506***	.0111
Length of urban residence squared	-.0008*	.0004	-.0008*	.0004	-.0008*	.0004	-.0009*	.0004
Physical health (ref. fair health or below)			.2407***	.0593			.1860**	.0604
Mental stress					-.0268***	.0052	-.0240***	.0053
Survey year	Yes		Yes		Yes		Yes	
City-fixed effects	Yes		Yes		Yes		Yes	
Observations	10,247		10,247		10,247		10,247	
F	20.10		19.99		20.16		19.88	
Prob > F	.000		.000		.000		.000	

Notes: Estimation is based on the multiple imputation method. "Yes" indicates that survey year and city-fixed effects are controlled in regression models. SE represents standard errors.

* p < .05.
** p < .01.
*** p < .001.

Table 3

Logistic regression results on the moderating effects of length of urban residence on the effects of health status on urban-settlement intention of rural-urban migrants and the interaction effect of physical health and mental health on urban-settlement intention of rural-urban migrants.

	Model 1		Model 2		Model 3	
	Coefficients	SE	Coefficients	SE	Coefficients	SE
Constant	−1.2899**	.4138	−1.1328**	.4228	−1.1212*	.4782
Gender (ref. male)	.0437	.0471	.0431	.0471	.0428	.0471
Age	.0415 [†]	.0183	.0416 [†]	.0183	.0417 [†]	.0183
Age squared	−.0005 [†]	.0002	−.0005 [†]	.0002	−.0005 [†]	.0002
Marital status (ref. married)	−.0166	.0717	−.0132	.0717	−.0130	.0717
Ethnicity (ref. minorities)	.4063 [†]	.1660	.4014 [†]	.1660	.4018 [†]	.1661
Education (ref. primary education and below)						
Middle school education	.0744	.0714	.0739	.0714	.0732	.0714
High school education	.0045	.0769	.0053	.0769	.0051	.0769
University education or above	.3023**	.1177	.3020**	.1176	.3021**	.1176
Income (ref. Less than 1000 yuan)						
1000–2000 yuan	.1574 [†]	.0634	.1593 [†]	.0634	.1592 [†]	.0634
2000–3000 yuan	.1951 [†]	.0792	.1957 [†]	.0792	.1954 [†]	.0791
More than 3000 yuan	.4542**	.0968	.4549**	.0967	.4544**	.0967
Labor contract (ref. no contract)	.1883**	.0504	.1887**	.0504	.1889**	.0504
Work industry (ref. construction)						
Manufacturing	.4188**	.0871	.4191**	.0871	.4196**	.0871
Transportation, warehouse, and wholesale	.4439**	.1428	.4393**	.1423	.4401**	.1423
Wholesale and retail	.6253**	.0841	.6248**	.0841	.6254**	.0841
Accommodation and catering	.4763**	.0876	.4746**	.0877	.4749**	.0877
Service industry	.4593**	.0881	.4577**	.0881	.4583**	.0881
Others	.3645**	.1163	.3655**	.1163	.3657**	.1163
Self-employed (ref. others)	.1804**	.0536	.1822**	.0536	.1821**	.0536
Dwelling ownership (ref. others)	.8963**	.1502	.9026**	.1501	.9031**	.1501
Hukou status (ref. local hukou)	−.2211**	.0710	−.2236**	.0710	−.2235**	.0709
Length of urban residence	.0656**	.0133	.0466	.0187	.0506**	.0111
Length of urban residence squared	−.0009 [†]	.0004	.0009 [†]	.0004	−.0009 [†]	.0004
Physical health (ref. fair health or below)	.3317**	.0963	.1862**	.0604	.1362	.2952
Mental stress	−.0239**	.0053	−.0255**	.0081	−.0259 [†]	.0124
Physical health × length of urban residence	−.0176 [†]	.0090				
Mental stress × length of urban residence			.0002	.0007		
Physical health × mental stress					.0023	.0135
Survey year	Yes		Yes		Yes	
City-fixed effects	Yes		Yes		Yes	
Observations	10,247		10,247		10,247	
F	19.41		19.37		19.36	
Prob > F	.000		.000		.000	

Notes: Estimation is based on the multiple imputation method. “Yes” indicates that survey year and city-fixed effects are controlled in regression models. SE represents standard errors.

[†]p < .1.

* p < .05.

** p < .01.

*** p < .001.

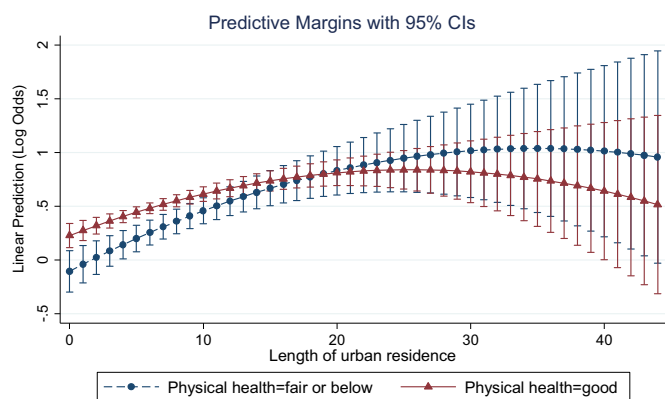


Fig. 2. The moderating effect of length of urban residence on the association between physical health and urban-settlement intention of rural-urban migrants.

6. Discussion

Recently, a plethora of studies have engaged in identifying the determinants of the urban-settlement intentions of Chinese rural-

urban migrants. However, the potential impact of health status is largely overlooked. This paper represents an attempt to study the relationship between rural-urban migrants’ self-rated physical and mental health and their urban-settlement intentions. Based on the healthy migrant paradox and the salmon bias hypothesis, this paper developed hypotheses regarding the relationship between health and the urban-settlement intentions of rural-urban migrants and tested the hypotheses using national survey data. Our aim is to complement the existing research by providing further insights into the factors that may affect the urban-settlement intentions of rural-urban migrants.

Our results suggested that physical health is significantly related to the urban-settlement intentions of rural-urban migrants. This result is not a big surprise considering that individuals with better physical health often have more opportunities to get better jobs make higher incomes. These factors are imperative for rural-urban migrants to reside in cities as shown in our regression results and previous studies (e.g. Cao et al., 2014; Hao and Tang, 2015; Liu and Wang, 2014). Besides, because many rural-urban migrants are excluded from the urban public healthcare system (Gong et al., 2012; Hu et al., 2008a, 2008b), if they are in poor health, they have to afford the expenditure of utilization of health services in urban areas, which is often extremely expensive relative to their income. Under such circumstance, rural-

urban migrants with poor health may be forced to return to the countryside to seek alternative treatment programs.

Our analysis indicated that rural-urban migrants with better mental health are more likely to stay in cities permanently. Migration is an extraordinarily stress-inducing event (Bhugra, 2004). The mental health of rural-urban migrants tends to become worse after they have migrated to the urban areas (Chen, 2011). The deterioration of mental health is due to discrimination, a lack of social support, and social segregation in the urban areas (Lin et al., 2011; Wong and Leung, 2008). Therefore, those rural-urban migrants who have poor mental health are often those who suffer social exclusion in urban society. According to the push-pull theory (Lee, 1966), the social exclusion could be seen as a push force that excludes rural-urban migrants from urban society. Rural-urban migrants in poor health are the victims of such social exclusion. Hence, there are great differences in the urban-settlement intentions of rural-urban migrants with different mental health.

Moreover, our results suggested that while length of urban residence does not moderate the effect of mental health on rural-urban migrants' urban-settlement intentions, it does moderate the effect of physical health on urban-settlement intentions. This may be because for those rural-urban migrants who have poor health and long-term duration of urban stay, they have been increasingly dependent on the relatively better medical resources in urban areas to cure the health problems that they have had. In this case, permanent urban settlement is a better option for them for the sake of accessing convenient healthcare services. In addition, there is no interaction effect of physical and mental health on the intentions of rural-urban migrants' urban settlement. According to Chen (2011), after moving into cities, the changes in rural-urban migrants' physical and mental health are distinctive. The different trajectories may explain why the impacts of physical and mental health on rural-urban migrants' urban-settlement intentions are independent of each other. Furthermore, a comparison of the influence of health on urban-settlement intention indicates that it shows no generational difference. This means that health is an important determinant on the intentions of rural-urban migrants of all ages to desire to stay in cities permanently.

The findings of this study have significant theoretical implications. Previous studies examining the healthy migrant paradox and the salmon bias hypothesis have normally focused on the physical health of migrants. This study, instead, extends the concept of health to a broader dimension and views mental health as a critical part. The significant association between mental health and urban settlement intentions means that mental health should not be neglected in the study regarding the relationship between health and migration. In fact, Chen (2011) found that the mental health of rural-urban migrants is worse than the urban natives, indicating the psychological well-being of this group is not optimistic. Our study also suggests that mental health deserves more attention in the examination of the relationship between health and migration in the future study.

The results that health status is closely linked to the urban-settlement intentions of the rural-urban migrants have several consequences and policy implications. First, rural-urban migrants are a big group of people in urban society. If the urban settlement of this group is based on health selection, the urbanization of China will be undermined in the long term. This is because once the unhealthy migrants are forced to go back to the countryside because of health issues, the urbanization of China may meet the so-called "ceiling effect". That is, when the urbanization ratio reaches some point, it will not increase anymore because the newly increased rural-urban migrants may be not enough to supplement the loss of unhealthy migrants. At this stage, the return of rural-urban migrants is not a very compelling phenomenon because of the relatively young age structure of migrants. However, with the increasingly aging and slowing down increase of the quantity

of rural-urban migrants (National Bureau of Statistics of China, 2015), the "ceiling effect" of urbanization may become more and more palpable in the future.

Second, the urban-settlement intentions of rural-urban migrants based on healthy selection might cause health disparity between rural areas and urban areas of China. Urbanization is associated with the risk of health in China, especially in terms of chronic diseases (Miao and Wu, 2016). This phenomenon means that rural-urban migrants are under the threat of developing health problems, because they are exposed to so many pathogenic factors like water pollution and air pollution in cities (Chen et al., 2013; Zhang et al., 2010). If rural-urban migrants are compelled to go back to rural areas because of health problems, it will result in more and more unhealthy people accumulating in rural areas. As a result, the health disparity between rural areas and urban areas may become larger and larger in the future.

Third, the consequence of healthy rural-urban migrants to settle in cities and unhealthy migrants to return to the countryside might be that it will aggravate the burden on the healthcare system in the countryside of China. At present, the healthcare system in rural areas is much poorer than urban areas in China. An inordinately large share of health budgets are allocated to top-tier hospitals in cities, while low-level health centers get very little (Hu et al., 2008a, 2008b). However, if more and more unhealthy people accumulate in rural areas, it may be more than the rural healthcare system can support, resulting in its crash. In this sense, our research may indicate that the Chinese government should reconsider the balance of healthcare services in rural areas and urban areas.

In a nutshell, earlier studies have emphasized three groups of factors at play in rural-urban migrants' urban-settlement intentions: institutional, demographic, and socioeconomic factors. The present study, however, indicates that the role of health should not be ignored. In fact, with the reform of the *hukou* system and the income convergence between rural-urban migrants and urban citizens (Cai and Du, 2011), the importance of socioeconomic factors influencing rural-urban migrants' urban settlement is gradually decreasing. On the other hand, health is becoming an increasingly important factor. Considering the fact that there are so many rural-urban migrants who are not covered by urban healthcare system, the Chinese government should take actions to make and implement health promotion policies to protect rural-urban migrants against health risks under rapid urbanization.

7. Conclusion

This study examined the relationship between health status and rural-urban migrants' urban-settlement intentions in China. The results indicated that both physical health and mental health are very important factors. Also, the effect of physical health on rural-urban migrants' urban-settlement intentions is moderated by the length of urban residence. Moreover, we also found that the urban-settlement intentions of new-generation migrants are more sensitive to health status than first-generation migrants. Based on the research findings, we highlight the importance of health for rural-urban migrants to settle down in urban areas. We argue that the urban-settlement intentions of rural-urban migrants based on health selection may harm urbanization, worsen health disparity between rural areas and urban areas, and aggravate the burden on the healthcare system in the countryside of China in the future. Therefore, the Chinese government should adopt countermeasures to protect rural-urban migrants against health risks to achieve a stable and sustainable urbanization process.

This study has a series of limitations too. First, to examine the influence of health status on the urban-settlement intentions of rural-urban migrants in China, we relied on information on self-rated health status rather than objective health indicators. This may inevitably

cause biased estimations because of the imprecise assessment of individuals' self-rated health conditions. Second, changes in health status take relatively long, meaning that longitudinal data would be more valid than the cross-sectional data used in this study. In addition, the measurement method regarding urban settlement intentions of rural-urban migrants is not unproblematic. The corresponding question has the premise of "if policy allowed". Some specific policies, however, might push certain groups of rural-urban migrants to leave the city. For instance, many urban governments restrict rural-urban migrants' children to access to public education in the city. Thus, the premise of "if policy allowed" may lead to overestimation of the true urban settlement intentions of rural-urban migrants. Finally, it should be noted that our results are restricted to the 15 cities across 9 provinces in our sample, while it remains obscure whether they can be generalized to the national level. It is crucial to use data from a larger geographical scope to examine the association between health status

and urban-settlement intention of rural-urban migrants in China. Our future research will employ both objective and subjective health indicators and longitudinal designs to collect data from more cities of China to understand how health status affects the intentions of rural-urban migrants in China to settle down in urban areas permanently.

Declaration of conflicting interests

The author declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

Ethical approval

The study was approved by the Ethics Committee of the author's institute.

Appendix A

see Appendix Tables A1 and A2

Table A1
The General Health Questionnaire (GHQ-12) to measure mental health of rural-urban migrants in China.

Have you ever had any of the following feelings in the last few weeks?	1	2	3	4
Been able to concentrate on whatever you are doing	Better than usual	Same as usual	Less than usual	Much less than usual
Lost much sleep over worry	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt that you are playing a useful part in things	More so than usual	same as usual	less than usual	much less than usual
Felt capable of making decisions about things	More so than usual	same as usual	less than usual	much less than usual
Felt constantly under strain	Not at all	No more than usual	Rather more than usual	Much more than usual
Felt you couldn't overcome your difficulties	Not at all	No more than usual	Rather more than usual	Much more than usual
Been able to enjoy your normal day to day activities	More so than usual	Same as usual	Less than usual	Much less than usual
Been able to face up to your problems	More so than usual	Same as usual	Less than usual	Much less than usual
Been feeling unhappy and depressed	Not at all	No more than usual	Rather more than usual	Much more than usual
Been losing confidence in yourself	Not at all	No more than usual	Rather more than usual	Much more than usual
Been thinking of yourself as a worthless person	Not at all	No more than usual	Rather more than usual	Much more than usual
Been feeling reasonably happy, all things considered	More so than usual	Same as usual	Less than usual	Much less than usual

Table A2
Logistic regression on the effects of health status on urban-settlement intention of first-generation migrants and new-generation migrants.

	Model 1 First-generation		Model 2 New-generation		Model 3		Model 4	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Constant	-1.5107	.9372	.8423	1.5433	-.4031	.2599	-.4954 [#]	.2789
Gender (ref. male)	.0730	.0697	.0255	.0655	.0439	.0469	.0439	.0469
Age	.0429	.0424	-.1236	.1350				
Age squared	-.0004	.0005	.0035	.0029				
Marital status (ref. married)	.2029	.1555	-.0826	.0876	-.1075 [#]	.0652	-.1073	.0652
Ethnicity (ref. minorities)	.5299 [*]	.2355	.2548	.2362	.3954 [†]	.1661	.3950 [†]	.1662
Education (ref. primary education and below)								
Middle school education	.0586	.0807	.1012	.1689	.0653	.0706	.0643	.0706
High school education	.0173	.0940	-.0001	.1717	-.0044	.0760	-.0052	.0760
University education or above	.3304	.2228	.2691	.2009	.3144 ^{**}	.1168	.3129 ^{**}	.1168
Income (ref. Less than 1000 yuan)								
1000–2000 yuan	.1463	.0907	.1605	.0905	.1707 ^{**}	.0630	.1705 ^{**}	.0630
2000–3000 yuan	.2652 [*]	.1113	.0954	.1157	.2090 ^{**}	.0787	.2091 ^{**}	.0787
More than 3000 yuan	.4280 ^{**}	.1302	.4864	.1488	.4709 ^{**}	.0963	.4704 ^{**}	.0963
Labor contract (ref. no contract)	.1154	.0759	.2449 ^{**}	.0691	.1880 ^{**}	.0504	.1879 ^{**}	.0504
Work industry (ref. construction)								
Manufacturing	.6305 ^{**}	.1162	.0737	.1419	.4144 ^{**}	.0871	.4146 ^{**}	.0871
Transportation, warehouse, and wholesale	.4158 [*]	.1756	.3948	.2402	.4479 ^{**}	.1421	.4480 ^{**}	.1420
Wholesale and retail	.7519 ^{**}	.1063	.3238 [†]	.1426	.6232 ^{**}	.0840	.6225 ^{**}	.0840
Accommodation and catering	.7117 ^{**}	.1185	.1104	.1416	.4690 ^{**}	.0875	.4680 ^{**}	.0875
Service industry	.6009 ^{**}	.1195	.1565	.1413	.4510 ^{**}	.0880	.4503 ^{**}	.0880

(continued on next page)

Table A2 (continued)

	Model 1 First-generation		Model 2 New-generation		Model 3		Model 4	
	Coefficients	SE	Coefficients	SE	Coefficients	SE	Coefficients	SE
Others	.4328**	.1447	.1550	.1986	.3720***	.1161	.3718***	.1162
Self-employed (ref. others)	.2052**	.0786	.1307*	.0747	.1817***	.0536	.1828***	.0536
Dwelling ownership (ref. others)	.9702***	.1887	.7403**	.2607	.8996***	.1498	.8994***	.1499
Hukou status (ref. local hukou)	-.2596**	.1013	-.1936*	.1014	-.2217**	.0709	-.2221**	.0709
Length of urban residence	.0589***	.0137	.0812	.0335	.0599***	.0104	.0598***	.0104
Length of urban residence squared	-.0011 [†]	.0004	-.0049 [†]	.0026	-.0011**	.0003	-.0011**	.0003
Physical health (ref. fair health or below)	.1724*	.0810	.2127***	.0075	.1453*	.0790	.1879**	.0604
Mental stress	-.0205**	.0077	-.0271 [†]	.0929	-.0238***	.0053	-.0209**	.0075
Generation (ref. first-generation)					-.0772	.1196	.1230	.2074
Physical health × new-generation					.0971	.1182		
Mental stress × new-generation							-.0059	.0100
Survey year	Yes		Yes		Yes		Yes	
City fixed-effects	Yes		Yes		Yes		Yes	
Observations	5247		5000		10,247		10,247	
F	10.68		9.68		19.86		19.81	
Prob > F	.000		.000		.000		.000	

Notes: Estimation is based on the multiple imputation method. “Yes” indicates that survey year and city-fixed effects are controlled in regression models. SE represents standard errors. In regression models to analyze the interact effects of health and generation, the age variable is replaced by the generation variable. In order to save the layout, the coefficients of other variables are not reported in the table.

[†] p < .1.

* p < .05.

** p < .01.

*** p < .001.

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