

Urban Older Adults Becoming Unhealthier in Modern China: A Cross-Temporal Meta-Analysis

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**Tengxiao Zhang, Hao Tan,
and Yiling Wu**

Department of Psychology, School of Social and Behavioral Sciences, Nanjing
University, Nanjing, China

Buxin Han

Key Laboratory of Mental Health, Institute of Psychology, Chinese Academy of
Sciences, Beijing, China

Ting Wang

Vocational College of Labour and Social Security, Beijing, China

Abstract

This study investigated patterns of change in the health status of urban older adults in urban China from 2001 to 2013. A cross-temporal meta-analysis was applied to 111 selected studies in which the SF-36 had been administered to urban older adults in China. Scores from a total of 72,441 participants were analyzed. Correlations between the SF-36 scores and sampling years were examined. The self-reported health status of urban older adults in China has declined significantly in the past 13 years. The observed decline in the health status of older adults suggests that economic progress and a rapidly aging population have had more negative than positive effects on the health of this population.

Keywords

older adults, SF-36, cross-temporal meta-analysis

Corresponding Author:

Buxin Han, Centre on Aging Psychology, Key Laboratory of Mental Health, Institute of Psychology,
Chinese Academy of Sciences, 4A Datun Road, Chaoyang District, Beijing 100101, China.
Email: hanbx@psych.ac.cn

Introduction

Currently, the world's population is aging in an unprecedented manner. The proportion of older people in the total population has increased from 8% in the 1950s to 11% in 2009, and it is projected to reach 22% in 2050 (*World Demographic Trends*, 2009). This pattern of population change has produced a series of problems. In Japan, for example, population aging caused a rapid increase in economy-wide consumption inequality during the 1980s (Ohtake & Saito, 1998). In Turkey, inadequate income, insufficient care units, lack of social welfare, and low education levels have reduced health status and quality of life among the rapidly increasing older population (Aksoydan, 2009). The need to reform public pension systems in response to population aging poses an urgent challenge for public policy in developed countries (Bongaarts, 2004). Developing countries face the same challenge, especially regarding pension policies related to low income elders (Lloyd-Sherlock, 2000).

China's population has aged substantially since 2001. According to the Sixth National Population Census, conducted in 2010, 13.26% of the population was older than 60 years of age, a 2.93-point increase since 2001 (*The Sixth National Census 2010 Bulletin*, 2011). The number of elderly people had reached 212.42 million (15.5% of the total population) in China which became the "oldest country" in the world (*National Economic and Social Development Statistics Bulletin*, 2014). The increasing demands for health care and public services from a rapidly increasing elderly population will create a strain on social security and welfare systems (Zhang, 2008). The problems posed by population aging may be more severe in China than in developed countries because the Chinese population is aging at a much faster rate, leaving China with less time to adjust to the consequences. Furthermore, population aging in China occurs in the context of low socioeconomic development relative to more developed countries.

One must also consider China's recent rapid economic development. From 2001 to 2013, the gross domestic product (GDP) increased at an average annual rate of 10.0%, while the social insurance spending and disposable income of urban residents increased at average annual rates of 20.8% and 9.4%, respectively (*China Statistical Yearbook*, 2014). This economic growth has been accompanied by steady improvement in the social welfare system for the elderly (*Yearbook of the People's Republic of China*, 2009). Pension services are primarily based on family care, with community and local institutions used for additional support (*China Development Report*, 2009).

Given that the elderly population of China is growing at a time of remarkable socioeconomic development, it is an open question whether and how the health status of older adults has changed during that time. Several studies have investigated this issue and yielded mixed results. In a study in Jiangsu province, no significant change was found in the physical fitness of older adults between 2000 and 2005 (Z. Xu, 2010). In addition, although the prevalence of hypertension decreased among older adults in Beijing from 2000 to 2007, the rates of

hypertension control did not increase during the same period (Zhao et al., 2010). Some researchers have reported improvements in the self-rated health of older Chinese adults between 1992 and 2002 (Gu, Dupre, Warner, & Zeng, 2009) and in the physical fitness of older adults in Shanghai between 2000 and 2005 (Liu & Fan, 2008), but others have reported declines. For example, the rate of disability among the Chinese urban elderly population was significantly higher in 2004 (6.9%) than it was in 1994 (5.3%) (Du & Wu, 2006). The current prevalence of self-reported depressive symptoms (39.86%) in the elderly population is also significantly higher than it was in the 1990s (Yu, Li, Cuijpers, Wu, & Wu, 2011).

Given the inconsistent findings of these studies, the relatively sparse sampling intervals, and the varied set of health indices used, a cross-temporal meta-analysis was conducted to gain a clearer picture of the health status of the elderly. First proposed by Twenge, cross-temporal meta-analysis is used to explore the nature of change within a set of variables over a period of time and the possible socio-economic factors underlying that change (Twenge, 2000, 2001a, 2001b; Twenge & Campbell, 2001). First, studies focusing on the same variables are sorted by the year of sampling, and studies conducted in the same year are merged into a single sample for that year. Correlations between sampling years and the pooled mean values are tested then to explore the change tendency of the focused variables (Pietschnig, Voracek, & Formann, 2010). Researchers have used this method to assess the mental health of middle-school students in China (Xin & Zhang, 2009).

The aim of this study was to explore changing patterns in the health status of older adults in China from 2001 to 2013. Articles that administered the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) to older adults in China were analyzed and the correlations between the SF-36 scores and sampling years were examined.

Method

Measures

In this research, the SF-36 score was selected as the index of health because it is a comprehensive summary of self-reported physical and mental health (Ware & Sherbourne, 1992). The subscales Physical Component Summary (PCS) and the Mental Component Summary (MCS) reflect physical health and mental health, respectively (Wang, Li, & Li, 2001; J. Xu, Hu, Yang, Wang, & Xie, 1999). The SF-36 was designed to be administered to the general population over the age of 14 years.

Study identification

Three Chinese versions of the SF-36 have been widely used (J. Li, Liu, Li, He, & Li, 2001; L. Li, Wang, & Shen, 2002; Wan, Fang, Shi, Chen, & Zhang, 1998).

With the exception of minor differences in the translation of certain items (different word choices, which convey the same meaning), the three versions are identical in structure and scoring method. For this reason, all of the studies that employed any one of the three versions were included in this study.

Studies that administered the SF-36 to older adults in mainland China between 2001 and 2015 were included in the analysis if they met each of three following criteria: they used the SF-36 as a measure; they provided basic descriptive statistics, including mean, standard deviation, and sample size (N); and they used the measure with an urban sample of individuals over 60 years of age. Studies were excluded if: the samples were from the countryside, the army, patients, Hong Kong, Macao, or Taiwan; the version of the SF-36 used was not one of the three Chinese versions mentioned previously; or the study merely reanalyzed previously published data.

The social systems, economic level, and pension policies of Hong Kong, Taiwan, and Macao are different from mainland China. The army is also a special group with its own pension system and most of the participants were senior officers. Samples from hospital were excluded, since the scores of patients would not reflect the health of the normal population. The rural population was also excluded because of the significant economic differences between urban and rural Chinese.

Study selection

A literature search was conducted in the Chinese National Knowledge Infrastructure (www.CNKI.net) and Wan-Fang (www.WanFangData.com.cn) databases, as well as the English databases EBSCOhost, ISI Web of Science and PubMed. “SF-36,” “older OR elderly,” and “China OR Chinese” were used as keywords in a full-text search process. Two independent reviewers examined the full text of all identified papers using the three criteria. Any discrepancies between reviewers were resolved, resulting in a final sample of 111 studies from a total of 962 initial search results. Most of the studies aimed to survey the health status of older adults who lived in urban community and to explore the relevant factors.

Data analysis

The studies were sorted by the sampling year, and the SF-36 scores were calculated for each year using an average weighted by sample size. Next, the correlation (weighted regression) between the scores of the integrated samples and the sampling year was computed (weighted by pooled sample size). The sampling year was obtained from the article when possible, or it was estimated by subtracting two years from the year of publication (Xin & Zhang, 2009).

Results

Study distribution

The 111 selected studies were published between 2003 and 2015 (3, 2, 5, 3, 4, 9, 11, 10, 9, 10, 15, 24, and 6 studies, respectively). A total of 72,441 participants were included, and China's three economic zones (West China, Central China, and East China) were represented by 28, 21, and 62 studies, respectively. Of the 111 studies, 110 were published in Chinese, and 1 was published in English. Very few articles were published in English-language journals that met each of three criteria. For example, of the 78 results retrieved on Web of Science, the majority of the studies were about diseases (28 studies) or were administered to an overseas Chinese sample (14 studies), and 35 other studies did not meet the inclusion criteria. Thus, only one English-language article was selected.

Health change in the past 13 years

No significant correlation ($r = -.28$, $p = .36$) was found between the mean age of each sample and the sampling year. This indicated that the samples were not increasing in age as the population aged.

The samples from different cities were divided into three groups, according to the three economic zones of China. Cities in the same economic zone had similar socioeconomic levels. Statistical tests detected no significant differences in PCS, $F = 0.03$, $p = .97$, or MCS, $F = 0.02$, $p = .98$, values between economic zones. Therefore, samples from cities with different socioeconomic levels were merged.

Table 1 shows the SF-36 scores of older adults living in urban China and the sample size for each sampling year from 2001 to 2013 (when rapid population aging occurred in China). The scores of PCS ($r = -.79$, $p = .001$) had a strong negative correlation with the sampling year. The correlation between MCS and the sampling year was also significant ($r = -.80$, $p = .001$). The regression with PCS and sampling year weighted by sample size yielded a significant effect for the sampling year ($\beta = -0.77$, $p = .002$, $R^2 = 0.60$). The similar result was found with MCS ($\beta = -0.80$, $p = .001$, $R^2 = .64$). These results indicate a significant decline in self-reported health status of older adults in China from 2001 to 2013, as shown in Figure 1.

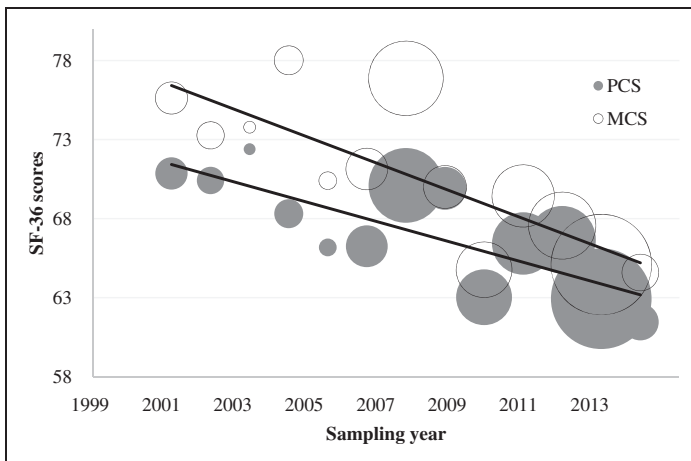
Discussion

As mentioned, previous studies on the health status of older Chinese adults had mixed results, which may be explained by differences in sample size, discrete sampling time, and the cities from which the samples were drawn. In fact, direct comparison of results across studies is impossible because of the variety of the measures and health indices used. Cross-temporal meta-analysis successfully

Table 1. SF-36 scores of urban older adults in China from 2001 to 2013.

Sampling year	N	PCS		MCS	
		M	SD	M	SD
2001	2129	70.86	28.08	75.63	25.73
2002	1538	70.41	28.76	73.26	24.92
2003	289	72.39	27.57	73.78	26.20
2004	1720	68.31	26.21	78.01	22.01
2005	652	66.18	28.78	70.40	23.78
2006	3581	66.25	27.52	71.14	23.72
2007	11,452	70.10	26.87	76.87	23.70
2008	3790	69.91	32.15	70.00	28.42
2009	6398	63.03	24.35	64.77	23.67
2010	8007	66.43	21.73	69.43	21.31
2011	9317	66.67	19.24	67.56	18.16
2012	20,799	62.94	21.34	65.10	20.89
2013	2769	61.46	23.16	64.59	21.76

MCS: mental component summary; PCS: physical component summary; SF-36: Medical Outcomes Study 36-Item Short-Form Health Survey.

**Figure 1.** SF-36 scores of urban older adults in China significantly decreased from 2001 to 2013.

MCS: mental component summary; PCS: physical component summary.

avoided these problems. Selected studies that used the SF-36 to investigate the health status of urban older Chinese adults were reviewed and evidence that the health status of the urban elderly was declining was found. There was an overall and credible decline in the health status of urban older adults in China from 2001 to 2013.

The decline of PCS was consistent with the findings of the three waves of the National Physical Fitness Survey conducted in 2000, 2005, and 2010. The results of this survey showed a slight but continuous decline in the overall level of physical health in older adults. In particular, since 2000, there had been a continuous increase in the number of overweight and obese older adults. Both conditions increased the risk for chronic diseases and mortality (*Report of People's Physique Monitoring*, 2005, 2010; Seidell, Hautvast, & Deurenberg, 1989).

The declining mental health of older adults in China, as the MCS scores by year indicated, supports evidence from previous studies. Another study using the same method found that the incidence of depression, as measured by the Center for Epidemiological Studies Depression Scale (CES-D) in older Chinese adults significantly increased from 1998 to 2008 (X. Li & Han, 2012). The mean CES-D scores of older Chinese adults increased at least 0.53 standard deviations from 1987 to 2010 (Shao et al., 2013). Similar changes have been found for loneliness (Yan, Yang, Wang, Zhao, & Yu, 2014) and subjective well-being (Yu et al., 2016) of older adults. These changes in the health of older Chinese adults have occurred within the context of social change. Marmot (2005) proposed that health problems have social determinants, such as population aging and economic changes.

Severe population aging has increased the pressure on social security and welfare systems. In China, families provide the bulk of care for the elderly. As the empty-nest phenomenon (elderly people living alone without children) became more widespread, family support for elderly people decreased, while pension services from community and local institutions has not kept pace with demand (Liu & Guo, 2008; Parker, Gladstone, & Chee, 2001). Because of population aging, the availability of resources for each older adult is reduced, and the current pension system is unable to provide adequate support. Older adults in China live longer than they used to but are likely less healthy.

It is unfortunate that, despite the rapid economic development occurring in China and the increase in the government's contribution to social welfare every year, the health of older Chinese adults continues to worsen. In China, the widening gap between the rich and the poor in recent years might be reducing the economic capacity of older adults and limiting their resources for medical care and daily activity. Ling (2009) found that relative deprivation might lead to poor health among older adults, given the disparate rates of development across different regions and cities in China. The growing GINI coefficient might also result in relative financial deprivation of the elderly. Although many older adults

purchase insurance and their absolute income has increased, their relative income has decreased. Daily expenses constitute a large proportion of consumption by older adults, and this proportion remained unimproved in 2006 (64.2%) compared with 2000 (63.3%) (*Report of Chinese Urban and Rural Elderly Population*, 2006). Consistent with the present results, other studies found that income, and especially income inequality, affected older adults' health via material conditions, social participation, and opportunities to control their life circumstances (Marmot, 2002; Marmot & Wilkinson, 2001). Low income tended to affect health status negatively (Hallerod & Gustafsson, 2011; Sun et al., 2011). Economic factors, such as relative deprivation and low income, might account for the decline in the health status of urban older adults.

In this situation, more social support (especially the support from families) for the older Chinese adults seems very important to compete with the negative effect of population aging. The positive news is the Two-child Policy (allowing a couple to have two children) implemented in China since 2016, which means the Single Child Family Program ended after 35 years. The dependency ratio and empty-nest proportion will decrease to some extent for the next wave of older adults. The other way to reduce relative deprivation and promote income for older adults is reform of the pension system.

Limitations of this study include the use of only SF-36 scores as the index of health status. Self-report measures are not as reliable as objective indices. Although it is suspected that the decreasing health status of older adults might be closely related to social change, this assumption was not tested directly. Further research is needed to explore the exact reasons (e.g., poverty) underlying the decline and to clarify the correlations between health status and socioeconomic indicators.

This study highlights the apparent decline in the health of older adults living in urban China. It is suspected that older adults in rural settings are affected by the same decline. Increasing numbers of rural adults in China have moved to cities in search of better jobs, and their parents have been left behind in rural areas, so family care for the rural elderly population has weakened. Relative deprivation might be more serious in rural areas because those regions are generally characterized by poorer social security systems and much lower income.

Declaration of Conflicting Interests

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Author Biographies

Tengxiao Zhang is an assistant professor of Psychology in the Department of Psychology at Nanjing University. His research focuses on mental health, aging, and color psychology.

Hao Tan is a undergraduate student in the Department of Psychology at Nanjing University. His research interests are mental health and color psychology.

Yiling Wu is a undergraduate student in the Department of Psychology at Nanjing University. Her research interests are mental health and color psychology.

Buxin Han is professor at the Key Lab of Mental Health, Institute of Psychology, Chinese Academy of Sciences. He is president of the Division of Ageing Psychology, Gerontological Society of China; and secretary-general of the International Association of Applied Psychology (IAAP). His research focuses on healthy development, cognitive aging, and psychology of religion.

Ting Wang is a lecturer at Beijing Vocational College of Labour and Social Security. She mostly focuses on the psychological intervention in nursing institution for the older adults.