

# Socioeconomic status, social capital, health risk behaviors, and health-related quality of life among Chinese older adults

**Ying Yang**

Wuhan University <https://orcid.org/0000-0001-9252-5071>

**Shizhen Wang**

Wuhan University

**Lei Chen**

Wuhan University

**Mi Luo**

Wuhan University

**Lina Xue**

Wuhan University

**Dan Cui**

Wuhan University

**Zongfu Mao** (✉ [zfmao@whu.edu.cn](mailto:zfmao@whu.edu.cn))

Wuhan University <https://orcid.org/0000-0001-9477-4725>

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## Research

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## Abstract

Background: There is limited knowledge on the mediating role of different health risk behaviors on the relationship between social capital, socioeconomic status (SES), and health-related quality of life (HRQoL) in Chinese elderly. We conducted this study to (a) investigate the condition of health risk behaviors of Chinese elderly, and (b) assess the relationship between SES, social capital, health risk behaviors, and HRQoL.

Methods: We conducted this cross-sectional study between January and March 2018. Participants' demographic characteristics, SES (education level, family income), and health risk behaviors (smoking, alcohol consumption, physical inactivity, unhealthy dietary behavior, unhealthy weight, and sleep disorder) were collected. Social capital and HRQoL were assessed by the 16-item Personal Social Capital Scale (PSCS-16) and WHOQOL-Old, respectively. Structural equation modeling (SEM) was applied to assess the associations between variables.

Results: A total of 4,868 adults aged 60 years and older were included in this study. The proportion of smoking, alcohol consumption, physical inactivity, unhealthy dietary behavior, unhealthy weight, and sleep disorder were 32.1%, 36.3%, 62.5%, 45.7%, 31.8%, and 45.5%, respectively. Significant differences were observed in education level, family income, and social capital between elderly individuals with and without each of the six health risk behavior (all p -values < 0.05). Elderly individuals who reported smoking, physical inactivity, unhealthy dietary behavior, and sleep disorder had significant lower HRQoL (all p -values < 0.05). SEM analysis showed that SES and social capital positively associated with alcohol consumption. Social capital negatively associated with smoking, physical inactivity, unhealthy dietary behavior, and sleep disorder. SES negatively associated with smoking, physical inactivity, unhealthy dietary behavior, unhealthy weight, and sleep disorder. Smoking, physical inactivity, unhealthy dietary behavior, and sleep disorder correlated with poorer HRQoL.

Conclusions: Chinese older adults demonstrated a high incidence of health risk behaviors, especially for physical inactivity (62.5%) and unhealthy dietary behavior (45.7%). Social capital and SES were correlated with the elderly's HRQoL, as well as with different health risk behaviors. Health risk behaviors played potential mediating role on the relationship of social capital, SES, and elderly health.

## Background

By the end of 2018, 249 million elderly residents are aged 60 years and older in China which account for 17.9% of the Chinese population [1]. Nearly 75% of the Chinese elderly suffer from chronic diseases and 40 million elderly people live with disability or partially disability in China [2-4]. Chinese elderly are undergoing unoptimistic health condition.

Daily behavioral lifestyles, such as smoking, drinking, physical activity, body mass index (BMI), dietary behavior, seat belt use, sleep impairment, were correlated with older adults' health [5, 6]. About 60% of the health influence factors were related to individual behavior and lifestyle and the effective control of health risk behaviors could prevent many disease [2, 7]. The identification of the impact of health risk factors on elderly health outcomes will help to better target health promotion [2].

Social capital is an intangible resource constructed by social relationship which has effects on health promotion [8-10]. The components of social capital, i.e. social networks, social participation, and trust, are related to self-rated health, mental health, and depressive symptom of elderly people [11]. Previous studies have explored the

impact and its pathways of social capital on individual health [12-16]. Huang et al. [17] and Chen et al. [18] proposed that social capital might indirectly affect the elderly's physical and mental health through their behaviors and lifestyle. However, several researchers have reported inconsistent results on the relationship between social capital and different health risk behaviors among Chinese elderly[19, 20]. Also, the mediating role of difference health risk behaviors on the relationship between social capital and quality of life are not yet clarified in the elderly population.

In addition, socioeconomic status (SES) is widely considered to associate with individuals' behavior and health [21-24]. Wang et al. [25] proposed that health-related behaviors could mediate the relationship between SES and elderly health. The relationship between SES and different health-related behaviors are different. For example, people with Low SES are more likely to report physical inactivity because of poor access to sports resources, but they are less likely to develop overweight or obesity due to relatively poor living and working conditions. Thus, the mediating role of different health-related behaviors on the relationship between SES and elderly health are worth exploring and need to be clarified.

In response to the above gaps, structural equation model (SEM) was employed to analyze relationships among SES, social capital, health risk behaviors, and health-related quality of life (HRQoL). The objectives of this study were to (a) describe the condition of health risk behaviors of Chinese elderly, and (b) assess the associations between SES, social capital, health risk behaviors, and HRQoL.

## Method

### Study population

The study design was a cross-sectional survey. We conducted the survey from January to March 2018. Elderly people aged 60 years and older were surveyed by convenient sampling from both offline and online sources. The questionnaire was completed by the elderly themselves, and those who cannot complete it themselves were assisted by their family caregivers. The response rate for the offline survey was 85.26%.

A total of 5,442 elderly individuals were investigated. This study aimed to assess the association between SES, social capital, health risk behaviors, and HRQoL, thus we excluded subjects with no relevant information ( $n = 574$ ). In this study, 4,868 individuals aged 60 years and older were included in the final analysis.

### Conceptual framework

The conceptual framework of the present study was adapted from the WHO conceptual framework for social determinants of health [26] (see **supplementary figure 1**). It was expected a priori that structural determinants, including poor socioeconomic status (low education level, low family income), low social capital would predict intermediary determinants (i.e. health risk behaviors in the present study). Structural and intermediary determinants were also expected to predict worse HRQoL. In addition, the intermediary determinants would mediate the relationship between structural determinants and HRQoL.

### Variables

## ***Demographic characteristics***

Participants' demographic characteristics were collected, including age, gender, marital status, and place of residence. Marital status was dichotomized into married and others (single, divorced, and widowed). Place of residence was divided into urban areas and rural areas.

## ***Socioeconomic status***

Socioeconomic status was a latent variable measured by two indicators: education level and family per-capita annual income (CHY). Education level was categorized as: 1 = below primary school, 2 = primary school, 3 = middle/high school, and 4 = college and above. Family per-capita annual income (CHY) was divided into four groups: 1 = < 15,000, 2 = 15,000-30,000, 3 = 30,000-45,000, and 4 =  $\geq$  45,000.

## ***Social capital***

Social capital was a latent variable using the dimensions of the 16-item Personal Social Capital Scale (PSCS-16) instrument as indicators [27]. PSCS-16 contains two subscales: bonding social capital (8 items) and bridging social capital (8 items). Bonding social capital refers to how well a person is embedded within their various networks of different types of people (e.g., family members, friends, former colleagues), and bridging social capital refers to how well a person is embedded within different types of social organizations [27]. Each item applied a 5-point Likert scale: 1 (a few), 2 (less than average), 3 (average), 4 (more than average), and 5 (a lot). The total score of PSCS-16 is obtained by adding up the scores of the items and can vary from 16 to 80. A higher PSCS-16 score indicates greater social capital.

## ***Health risk behaviors***

Six health risk behaviors were included in this study: (1) smoking, current smokers were categorized as a smoking group; (2) alcohol consumption was defined as drinking frequency  $\geq$  1 time per week; (3) physical inactivity, elderly individuals who did not meet the standard set by the Chinese Center for Disease Control and Prevention (CDC), i.e. doing exercise more than three times per week and at least 30 minutes per time, were identified as physical inactivity; (4) unhealthy dietary behavior, individuals who self-reported skipping breakfast or having an unbalanced diet such as an insufficient intake of vegetables and fruit were identified as having unhealthy dietary behavior; (5) unhealthy weight was identified as body mass index (BMI)  $>$  26.9 kg/m<sup>2</sup> or  $<$  20 kg/m<sup>2</sup> based on the BMI criteria for Chinese elderly from Chinese Nutrition Society (CNS) [28]; (6) Sleep disorder was assessed by the question "Do you have any sleep problems, such as insomnia, dreaminess or unstable sleep, fitful sleep, hypersomnia? (yes/no)" The response of "yes" represented having sleep disorder.

## ***Health-related Quality of life***

The outcome of HRQoL was assessed using the WHOQOL-Old [29]. WHOQOL-Old is a well-developed instrument with adequate reliability and validity, and has been widely used to assess HRQoL in many countries [30]. The WHOQOL-Old contains 24 items distributed into six subscales: sensory abilities; autonomy; past, present, and future activities; social participation; death and dying; and intimacy. Each item was scored on a Likert-type scale

ranging from 1 to 5, with two subscales (sensory abilities, death and dying) applied reverse scoring. The total score ranges from 24 to 120, with higher score indicates better HRQoL. HRQoL was identified as a latent variable using the scores of each subscale as indicators.

## Statistical analysis

The descriptive analysis reported the distribution of the variables through means and standard deviations ( $SD$ ) (continuous variables) and proportions (categorical variables). Univariate analysis was conducted by ANOVA and Chi-square test. Confirmatory factor analysis (CFA) was used to evaluate the measurement model involving three latent variables (socioeconomic status, social capital, and HRQoL). Structural equation modeling was used to verify the direct and indirect relationships between observed and latent variables according to the conceptual framework. Parameters were estimated by the maximum-likelihood method. The evaluation of the model fit was based on the following criteria: standardized root-mean-square residual (SRMR)  $\leq 0.08$ , root-mean-square error of approximation (RMSEA)  $\leq 0.08$ , goodness of fit index (GFI)  $\geq 0.90$ , comparative fit index (CFI)  $\geq 0.90$ , normed fit index (NFI)  $\geq 0.90$  [31]. Data analysis was conducted using IBM SPSS Statistics 22.0 and IBM SPSS AMOS 24.0 software. In all analyses, a two-sided  $p$ -value  $< 0.05$  was considered statistically significant.

## Results

### Descriptive statistics

**Table 1** provides an overall summary of all the variables. A total of 4,868 elderly people with an average age of 71.0 years ( $SD = 7.8$ ) participated in this study. Among the participants, 49.5% ( $n = 2,408$ ) were male, 67.6% ( $n = 3,292$ ) were married, 78.0% ( $n = 3797$ ) lived in rural areas, 66.4% ( $n = 3,232$ ) had an education level of primary school and below, 36.0% ( $n = 1751$ ) reported a family per-capita annual income of less than 15,000 CHY. The overall score of social capital and HRQoL were 41.9 ( $SD = 14.5$ ) and 77.3 ( $SD = 12.4$ ). The proportion of smoking, alcohol consumption, physical inactivity, unhealthy dietary behavior, unhealthy weight, and sleep disorder were 32.1%, 36.3%, 62.5%, 45.7%, 31.8%, and 45.5%, respectively.

### Univariate analysis

We assessed the differences of socioeconomic status, social capital, and HRQoL in participants with or without a certain health risk behavior (**Table 2**). Participants with different education level and income level had significant different proportion of all six health risk behaviors (all  $p$ -values  $< 0.01$ ). Significantly lower social capital score were observed in elderly individuals with the behavior of smoking ( $t = 3.29, p < 0.01$ ), physical inactivity ( $t = 15.48, p < 0.001$ ), unhealthy dietary behavior ( $t = 15.50, p < 0.001$ ), unhealthy weight ( $t = 2.59, p < 0.05$ ), and sleep disorder ( $t = 14.49, p < 0.001$ ) than individuals without these behaviors. Participants with the behavior of alcohol consumption had significant higher social capital score than those without the behavior ( $t = -3.05, p < 0.01$ ). Significantly lower HRQoL score were observed in participants with the behavior of smoking ( $t = 6.03, p < 0.001$ ), physical inactivity ( $t = 25.83, p < 0.001$ ), unhealthy dietary behavior ( $t = 17.15, p < 0.001$ ), and sleep disorder ( $t = 17.13, p < 0.001$ ) than individuals without these behaviors.

## SEM results

Confirmatory factor analysis evaluated the measurement model for the latent variables: socioeconomic status, social capital, and HRQoL. Model fit statistics for confirmatory factor analysis indicated a good model fit of the measurement model with the following values: SRMR = 0.0695, RMSEA = 0.08, GFI= 0.96, CFI= 1.00, NFI= 0.95. Also, three latent variables showed good internal consistency reliability in this sample. (**supplementary table 1**).

Similar to the measurement model, the model fit statistics suggest that the final SEM model fits our data well with the following values: SRMR = 0.0795, RMSEA = 0.07, GFI = 0.95, CFI = 0.91, NFI = 0.91. **Figure 1** demonstrates the results of structural modeling. Social capital was positively associated with alcohol consumption ( $\beta = 0.05, p < 0.05$ ) and negatively associated with smoking ( $\beta = -0.10, p < 0.001$ ), physical inactivity ( $\beta = -0.25, p < 0.001$ ), unhealthy dietary behavior ( $\beta = -0.37, p < 0.001$ ), and sleep disorder ( $\beta = -0.34, p < 0.001$ ). SES was positively associated with alcohol consumption ( $\beta = 0.08, p < 0.001$ ) and negatively associated with smoking ( $\beta = -0.08, p < 0.001$ ), physical inactivity ( $\beta = -0.42, p < 0.001$ ), unhealthy dietary behavior ( $\beta = -0.08, p < 0.001$ ), unhealthy weight ( $\beta = -0.17, p < 0.001$ ), and sleep disorder ( $\beta = -0.17, p < 0.001$ ). In addition, smoking ( $\beta = -0.06, p < 0.05$ ), physical inactivity ( $\beta = -0.26, p < 0.001$ ), unhealthy dietary behavior ( $\beta = -0.12, p < 0.001$ ), and sleep disorder ( $\beta = -0.15, p < 0.001$ ) negatively associated with HRQoL.

## Discussion

Chinese elderly are undergoing unoptimistic health condition. Advocating healthy behavioral lifestyles and promoting elderly health have becoming a noteworthy topic in China [2]. In this study, we investigated six health risk behaviors of Chinese elderly: smoking, alcohol consumption, physical inactivity, unhealthy dietary behavior, unhealthy weight, and sleep disorder. SEM results clarified the relationship between social capital, SES, different health risk behavior, and HRQoL.

In this study, the proportion of six health risk behaviors varied from 31.8% to 62.5%. Thirty-five percent of the participants reported smoking. The proportion is much higher than the Chinese Center for Disease Control and Prevention reported in adults aged 15 years and older (26.6%) [32]. We found that 64.3% and 45.0% of the Chinese elderly have physical inactivity and unhealthy dietary behavior which was obviously at a high-risk level. As expected, the results of univariate analysis and SEM analysis indicated significant correlation between smoking, physical inactivity, unhealthy dietary behavior, sleep disorder, and poorer HRQoL. The analysis did not find significant correlation between alcohol consumption, unhealthy weight, and HRQoL in the elderly. Thus, targeting appropriate behavioral interventions regarding these health risk behaviors could be helpful for elderly health promotion in China.

This study found that social capital negatively associated with smoking, physical inactivity, unhealthy dietary behavior, and sleep disorder. This is in agreement with previous studies [8-10, 33, 34]. We also revealed significant correlation between higher social capital and alcohol consumption. This finding is in line with several previous studies conducted in Chinese population [20, 35]. Yuan [20] noted that social trust in community-level was a protective factor for Chinese elderly's drinking behavior. Gao et al. [35] reported that higher individual-level social capital may protect against hazardous drinking among Chinese rural-urban migrant workers.

The results of SEM analysis confirmed the mediating role of health risk behaviors on the relationship between social capital and HRQoL among Chinese older adults. Social capital was detected to be indirectly associated

with the elderly's HRQoL through the six health risk behaviors ( $\beta = 0.1664$ ). In consistent with Han et al.'s report [36] in Chinese adult residents. However, Poortinga et al.'s study [15] among English adult population aged 16 and over did not confirm that health behaviors mediate the association between social capital and health. The inconsistent results might be due to differences in study population. Generally, social capital played potential protective roles in improving HRQoL and decreasing some health risk behaviors. Thus, it should be considered as an important health component of elderly people and needs to be strengthened in a targeted way among Chinese elderly.

In this study, higher SES was detected negatively correlated with smoking, physical inactivity, unhealthy dietary behavior, unhealthy weight, and sleep disorder. We also found that SES positively correlated with the elderly's HRQoL through health risk behaviors ( $\beta = 0.1491$ ). The findings are consistent with previous research among Chinese adult residents [37, 38]. Thus, elderly people with low SES should be focused when it comes to health promotion and behavioral intervention in China.

This study also found positive correlation between SES and alcohol consumption, that is, elderly people with higher SES had higher proportion of alcohol consumption than those with lower SES. It can be seen that both social capital and SES are protective factors for drinking behavior of elderly people. The different result between drinking behavior and other health risk behaviors might be due to that most Chinese people considered drinking as a need for social communication and business engagement.

Chinese government implemented "Elderly Health Promotion Action" as part of the "Healthy China Action (2019-2030)" [2]. Improving elderly health requires an insight into the factors related to the health of Chinese older adult. This study reinforced the important role (direct and indirect) of health risk behaviors in elderly health, as well as the relationship between social capital, SES and elderly health.

Several potential limitations should be mentioned regarding this study. Firstly, participants recruited by convenience sampling from both offline and online sources, and mainly conducted in Hubei, Jiangxi, Guangdong, and Fujian provinces, which may not be able to fully represent the whole of China. Secondly, recall bias due to false or inaccurate responses from the participants could have played a role in our results. Thirdly, the cross-sectional nature of this study may be considered a weakness, as no causal inferences can be drawn from the results. For example, it may well be that poor health leads to lower social capital instead of the other way around. Longitudinal studies could provide more definite information on the possible causal pathways [39]. Fourthly, education level and family income level were included in the SEM analysis as ordered variable which may have potential effect on estimating results. Despite these limitations, this study is the first to explore the mediating role of different health risk behavior on the relationship between social capital, SES, and elderly health. The results might be a valuable references for the implementation of current "Elderly Health Promotion Action" [2] and future relevant research.

## Conclusion

Chinese elderly demonstrated a high incidence of health risk behaviors, especially for physical inactivity (62.5%) and unhealthy dietary behavior (45.7%). Smoking, physical inactivity, unhealthy dietary behavior, and sleep disorder negatively associated with the elderly's HRQoL. Both social capital and SES were found to be correlated with the elderly's HRQoL, as well as with the different health behaviors. Health risk behaviors played potential mediating role on the relationship of social capital, SES, and elderly health. It is necessary to develop targeted

intervention towards social capital and different health risk behaviors so as to improve elderly health. Moreover, the focus of policy on elderly people with different SES might make sense.

## List Of Abbreviations

BMI: Body Mass Index; CFA: Confirmatory Factor Analysis; HRQoL: Health-related Quality of Life; PSCS: Personal Social Capital Scale; SD: Standard Deviations; SEM: Structural Equation Model; SES: Socioeconomic Status; WHO: World Health Organization.

## Declarations

### Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki, and the study protocol was reviewed and approved by the Institutional Review Board of Faculty of Medical Sciences, Wuhan University (IRB number: 2019YF2050). Informed consent information was included with each questionnaire and introduced before the surveys. Surveys were only conducted if subjects were fully informed of the content and aim of this research project and agreed to participate.

### Consent for publication

Not applicable

### Availability of data and materials

The datasets generated during and/or analyzed during the current study are available from the corresponding authors on reasonable request.

### Competing interests

The authors declare that they have no competing interests.

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### Authors' contributions

DC and ZM designed the study. LC, ML, and LX collected data, YY, SW, and LC analyzed and interpreted the data. YY and SW drafted the manuscript. DC supervised the study and critically revised the manuscript for important

intellectual content and final approval of the version to be published. All authors have read and approved the manuscript.

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## References

- 1 People's Republic of China. National Economy Press Conference 2018. Available from:  
<http://www.scio.gov.cn/xwfbh/xwbfbh/wqfbh/39595/39709/>.
- 2 Chinese government website. Healthy China Action (2019-2030). 2019. Available from:  
<http://www.nhc.gov.cn/guihuaxxs/s3585u/201907/e9275fb95d5b4295be8308415d4cd1b2.shtml>.
- 3 Wang L, Chen Z, Zhang M, Zhao Z, Huang Z, Zhang X, et al. Study of the prevalence and disease burden of chronic disease in the elderly in China. *Chinese Journal of Epidemiology*. 2019;40(3):277-283.  
doi:10.3760/cma.j.issn.0254-6450.2019.03.005
- 4 Xu X, Huang X, Zhang X, Chen L. Family Economic Burden of Elderly Chronic Diseases: Evidence from China. *Healthcare* (Basel, Switzerland). 2019;7(3):99. doi:10.3390/healthcare7030099
- 5 Wolf MS, Gazmararian JA, Baker DW. Health Literacy and Health Risk Behaviors Among Older Adults. *American Journal of Preventive Medicine*. 2007;32(1):19-24. doi:10.1016/j.amepre.2006.08.024
- 6 Nigg CR, Burbank PM, Padula C, Dufresne R, Rossi JS, Velicer WF, et al. Stages of change across ten health risk behaviors for older adults. *Gerontologist*. 1999;39(4):473-82. doi:10.1093/geront/39.4.473.
- 7 Zhang L, Kong L. Prevent chronic diseases: a vital investment. *Chinese Journal of Prevention and Control of Chronic Non-Communicable Diseases*. 2006;(01):1-4.
- 8 Hawe P, Shiell A. Social capital and health promotion: a review. *Social Science & Medicine*. 2000;51(6):871-885. doi:10.1016/S0277-9536(00)00067-8
- 9 Chen X, Stanton B, Kaljee LM, Fang X, Xiong Q, Lin D, et al. Social Stigma, Social Capital Reconstruction and Rural Migrants in Urban China: A Population Health Perspective. *Hum Organ*. 2011;70(1):22-32.  
doi:10.17730/humo.70.1.k76047734m703500.
- 10 Hassanzadeh J, Asadi-Lari M, Baghbanian A, Ghaem H, Kassani A, Rezaianzadeh A. Association between social capital, health-related quality of life, and mental health: a structural-equation modeling approach. *Croat Med J*. 2016;57(1):58-65. doi:10.3325/cmj.2016.57.58.
- 11 Ye B, Gao J, Fu H. Influence of Social Capital to Physical and Mental Health of Elderly. *Medicine and Society*. 2018;31(02):21-23. doi:10.13723/j.xysh.2018.02.007.
- 12 McPherson KE, Kerr S, Morgan A, McGee E, Cheater FM, McLean J, et al. The association between family and community social capital and health risk behaviours in young people: an integrative review. *BMC Public Health*.

2013;13:971. doi:10.1186/1471-2458-13-971.

- 13 Chen D, Yang TC. The pathways from perceived discrimination to self-rated health: an investigation of the roles of distrust, social capital, and health behaviors. *Soc Sci Med*. 2014;104:64-73. doi:10.1016/j.socscimed.2013.12.021.
- 14 Nieminen T, Prättälä R, Martelin T, Häkkinen T, Hyppä MT, Alanen E, et al. Social capital, health behaviours and health: a population-based associational study. *BMC Public Health*. 2013;13:613. doi:10.1186/1471-2458-13-613.
- 15 Poortinga W. Do health behaviors mediate the association between social capital and health? *Prev Med*. 2006;43(6):488-493. doi:10.1016/j.ypmed.2006.06.004.
- 16 Mohnen SM, Völker B, Flap H, Groenewegen PP. Health-related behavior as a mechanism behind the relationship between neighborhood social capital and individual health—a multilevel analysis. *BMC Public Health*. 2012;12:116. doi:10.1186/1471-2458-12-116.
- 17 Huang W, Lu Q, Zhao M. The Path about the Social Capital Effecting on Health of Elderly in Poverty Rural of the Western: A Testing Mediation Based on Simultaneous Equations Model. *Population & Economics*. 2015; (05):61-71. doi:10.3969/j.issn.1000-4149.2015.05.007.
- 18 Chen Z, Dai Y. The influence of social capital on the health of the elderly based on modern medical model. *Chinese Journal of Health Education*. 2019;35(08):735-738. doi:10.16168/j.cnki.issn.1002-9982.2019.08.013.
- 19 Yun EH, Kang YH, Lim MK, Oh JK, Son JM. The role of social support and social networks in smoking behavior among middle and older aged people in rural areas of South Korea: a cross-sectional study. *BMC Public Health*. 2010;10:78. doi:10.1186/1471-2458-10-78.
- 20 Yuan L. Analysis of the effects of social capital on the smoking and drinking behaviors of the elderly in China: an evidence-based study based on the CHALRS Data. Shandong University, 2019.
- 21 Korous KM, Causadias JM, Bradley RH, Luthar SS. Unpacking the link between socioeconomic status and behavior problems: A second-order meta-analysis. *Dev Psychopathol*. 2018;30(5):1889-1906. doi:10.1017/S0954579418001141.
- 22 Valencia MLC, Tran BT, Lim MK, Choi KS, Oh JK. Association Between Socioeconomic Status and Early Initiation of Smoking, Alcohol Drinking, and Sexual Behavior Among Korean Adolescents. *Asia Pac J Public Health*. 2019;31(5):443-453. doi:10.1177/1010539519860732.
- 23 Elgar FJ, Trites SJ, Boyce W. Social capital reduces socio-economic differences in child health: evidence from the Canadian Health Behaviour in School-Aged Children study. *Can J Public Health*. 2010;101 Suppl 3:S23-7.
- 24 Burkert NT, Freidl W, Muckenhuber J, Großschädl F, Stronegger WJ, Rásky E. Social status as a mediator of self-perceived health, quality of life and health-related behaviour in obesity. *Gesundheitswesen*. 2013;75(7):e101-7. doi:10.1055/s-0032-1327748.

- 25 Wang F, Zhen Q, Li K, Wen X. Association of socioeconomic status and health-related behavior with elderly health in China. *PLoS One*. 2018;13(9):e0204237. doi:10.1371/journal.pone.0204237.
- 26 World Health Organization. A conceptual framework for action on the social determinants of health. Geneva: World Health Organization, 2010.
- 27 Wang P, Chen X, Gong J, Jacques-Tiura AJ. Reliability and Validity of the Personal Social Capital Scale 16 and Personal Social Capital Scale 8: Two Short Instruments for Survey Studies. *Social Indicators Research*. 2014;119(2):1133-1148. doi:10.1007/s11205-013-0540-3.
- 28 Chinese Nutrition Society, Chinese Dietary Guidelines 2016. Beijing: People's Medical Publishing House, 2018.
- 29 Power M, Quinn K, Schmidt S. Development of the WHOQOL-Old Module. *Quality of Life Research*. 2005;14(10):2197-2214. doi:10.1007/s11136-005-7380-9.
- 30 Van Biljon L, Nel P, Roos V. A partial validation of the WHOQOL-OLD in a sample of older people in South Africa. *Glob Health Action*. 2015;8:28209. doi:10.3402/gha.v8.28209.
- 31 Gomes AC, Rebelo MAB, de Queiroz AC, de Queiroz Herkrath APC, Herkrath FJ, Rebelo Vieira JM, et al. Socioeconomic status, social support, oral health beliefs, psychosocial factors, health behaviours and health-related quality of life in adolescents. *Qual Life Res*. 2020;29(1):141-151. doi:10.1007/s11136-019-02279-6.
- 32 Chinese Center for Disease Control and Prevention. Tobacco Survey for Chinese Adults 2018. 2019. Available from: [http://www.chinacdc.cn/jkzt/sthd\\_3844/slhd\\_4152/201906/t20190601\\_202997.html](http://www.chinacdc.cn/jkzt/sthd_3844/slhd_4152/201906/t20190601_202997.html).
- 33 Emmering SA, Astroth KS, Woith WM, Dyck MJ, Kim M. Social capital, health, health behavior, and utilization of healthcare services among older adults: A conceptual framework. *Nurs Forum*. 2018;53(4):416-424. doi:10.1111/nuf.12268.
- 34 Mohnen SM, Völker B, Flap H, Groenewegen PP. Health-related behavior as a mechanism behind the relationship between neighborhood social capital and individual health—a multilevel analysis. *BMC Public Health*. 2012;12:116. doi:10.1186/1471-2458-12-116.
- 35 Gao J, Weaver SR, Fua H, Pan Z. Does workplace social capital associate with hazardous drinking among Chinese rural-urban migrant workers? *PLoS One*. 2014;9(12):e115286. doi:10.1371/journal.pone.0115286.
- 36 Han L, Bai Y, Zhang L. Social Capital and Individual Health: Empirical Analysis Based on CFPS Data. *Journal of Xiangtan University (Philosophy and Social Sciences)*. 2019;43(01):119-124. doi:10.13715/j.cnki.jxupss.2019.01.018.
- 37 Xue X, Jiang G, Song G, Wang D, Li W, Zhang H, et al. Impact of socioeconomic status on health-related behaviors among Tianjin residents. *Chinese Journal of Prevention and Control of Chronic Diseases*. 2019;27(05):360-363. doi:10.16386/j.cjpccd.issn.1004-6194.2019.05.010.
- 38 Wang F. Socioeconomic Status, Lifestyle and Health Inequality. *Chinese Journal of Sociology*. 2012;32(02):125-143. doi:10.15992/j.cnki.31-1123/c.2012.02.001.

## Tables

**Table 1. Participants' demographic characteristics, socioeconomic status, social capital, health risk behaviors, and health-related quality of life (HRQoL).**

Variables	N = 4,868
Age, mean $\pm$ SD	71.0 $\pm$ 7.8
Gender (1= Male, 0=Female)	2408 (49.5)
Marital status (1=Married, 0=Others)	3292 (67.6)
Place of residence (1=Rural, 0=Urban)	3797 (78.0)
<b>Socioeconomic status</b>	
Education level	
<Primary school	1971 (40.5)
Primary school	1261 (25.9)
Middle/high school	1283 (26.4)
$\geq$ College	353 (7.3)
Family per-capita annual income (CHY)	
$\leq$ 15,000	1751 (36.0)
15,000-30,000	1217 (25.0)
30,000-45,000	936 (19.2)
>45,000	964 (19.8)
<b>Health risk behaviors</b>	
Smoking (1=Yes, 0=No)	1563 (32.1)
Alcohol consumption (1=Yes, 0=No)	1769 (36.3)
Physical inactivity (1=Yes, 0=No)	3044 (62.5)
Unhealthy dietary behavior (1=Yes, 0=No)	2226 (45.7)
Unhealthy weight (1=Yes, 0=No)	1549 (31.8)
Sleep disorder (1=Yes, 0=No)	2214 (45.5)
<b>Social capital</b>	
Overall social capital, mean $\pm$ SD	41.9 $\pm$ 14.5
Bonding social capital, mean $\pm$ SD	22.7 $\pm$ 7.2
Bridging social capital, mean $\pm$ SD	19.2 $\pm$ 8.2
<b>HRQoL</b>	
Overall HRQoL, mean $\pm$ SD	77.3 $\pm$ 12.4
Sensory abilities, mean $\pm$ SD	12.8 $\pm$ 2.9
Autonomy, mean $\pm$ SD	13.6 $\pm$ 3.3
Past, present and future activities, mean $\pm$ SD	13.0 $\pm$ 3.0
Social participation, mean $\pm$ SD	13.0 $\pm$ 2.9
Death and dying, mean $\pm$ SD	12.1 $\pm$ 3.3
Intimacy, mean $\pm$ SD	12.8 $\pm$ 3.3

Continuous variables are presented as mean and standard deviation (SD), categorical variables are presented as frequency (n) and percentage (%). For binary variables, the frequency (n) and percentage (%) of observations coded 1 are presented.

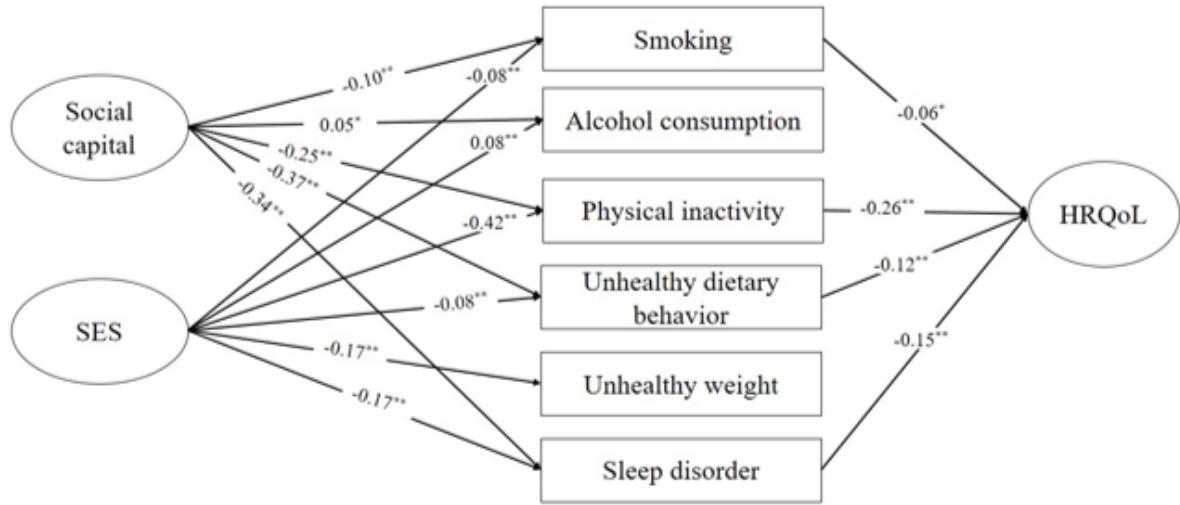
**Table 2. Socioeconomic status, social capital, and HRQoL in participants with or without a certain health risk behavior.**

Variables	Smoking		Alcohol consumption		Physical inactivity		Unhealthy dietary behavior		Unhealthy weight		Sleep disorder	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
<b>Education level</b>												
<Primary school	593	1378	644	1327	1351	620	1045	926	642	1329	927	1044
	(30.1)	(69.9)	(32.7)	(67.3)	(68.5)	(31.5)	(53.0)	(47.0)	(32.6)	(67.4)	(47.0)	(53.0)
Primary school	377	884	443	818	777	484	541	720	436	825	547	714
	(29.9)	(70.1)	(35.1)	(64.9)	(61.6)	(38.4)	(42.9)	(57.1)	(34.6)	(65.4)	(43.4)	(56.6)
Middle/high school	465	818	524	759	753	530	505	778	371	912	603	680
	(36.2)	(63.8)	(40.8)	(59.2)	(58.7)	(41.3)	(39.4)	(60.6)	(28.9)	(71.1)	(47.0)	(53.0)
≥College	128	225	158	195	163	190	135	218	100	253	137	216
	(36.3)	(63.7)	(44.8)	(55.2)	(46.2)	(53.8)	(38.2)	(61.8)	(28.3)	(71.7)	(38.8)	(61.2)
$\chi^2$	19.38***		34.30***		79.24***		75.20***		11.90**		11.69**	
<b>Income level</b>												
<15,000 CHY	612	1139	584	1167	1389	362	885	866	676	1075	966	785
	(35.0)	(65.0)	(33.4)	(66.6)	(79.3)	(20.7)	(50.5)	(49.5)	(38.6)	(61.4)	(55.2)	(44.8)
15,000-30,000 CHY	406	811	445	772	870	347	620	597	375	842	587	630
	(33.4)	(66.6)	(36.6)	(63.4)	(71.5)	(28.5)	(50.9)	(49.1)	(30.8)	(69.2)	(48.2)	(51.8)
30,000-45,000 CHY	278	658	351	585	410	526	371	565	258	678	366	570
	(29.7)	(70.3)	(37.5)	(62.5)	(43.8)	(56.2)	(39.6)	(60.4)	(27.6)	(72.4)	(39.1)	(60.9)
≥45,000 CHY	267	697	389	575	375	589	350	614	240	724	295	669
	(27.7)	(72.3)	(40.4)	(59.6)	(38.9)	(61.1)	(36.3)	(63.7)	(24.9)	(75.1)	(30.6)	(69.4)
$\chi^2$	18.46***		14.04**		622.33***		78.17***		66.86***		171.42***	
<b>Social capital</b>												
40.9 ± 14.6	42.8 ± 14.6	41.4 ± 14.4	39.5 ± 14.2	46.0 ± 14.0	38.5 ± 14.1	44.8 ± 14.1	41.1 ± 14.1	42.3 ± 14.1	38.7 ± 14.6	44.6 ± 13.6	44.6 ± 13.6	44.6 ± 14.7
$t$	3.29**		-3.05**		15.48***		15.50***		2.59*		14.49***	
<b>HRQoL</b>												
75.7 ± 12.6	78.0 ± 12.6	77.6 ± 12.6	77.1 ± 12.3	74.1 ± 12.3	82.7 ± 12.3	74.1 ± 10.6	80.0 ± 11.8	76.8 ± 11.8	77.5 ± 12.2	74.1 ± 12.5	80.0 ± 11.9	74.1 ± 12.2
	(14.6)	(12.6)	(12.6)	(12.3)	(12.3)	(10.6)						
$t$	6.03***		-1.21		25.83***		17.15***		1.83		17.13***	

Continuous variables are presented as mean and standard deviation (*SD*), categorical variables are presented as frequency (*n*) and percentage (%).

\*\*\**p* <0.001, \*\**p* <0.01, \**p* <0.05

## Figures



**Figure 1**

Structural model of associations between SES, social capital, health risk behaviors, and HRQoL. Note: numbers in the figure represent standardized path coefficients. Model fit statistics: SRMR = 0.0795, RMSEA = 0.07, GFI = 0.95, CFI = 0.91, NFI = 0.91. \*\* $p < 0.01$ , \* $p < 0.05$

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryFile.docx](#)