Leisure Activities and Chinese Older Adults' Cognitive Function

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Abstract. Through analyzing the 2011 data released by the Chinese Longitudinal Healthy Longevity Survey (CLHLS), this study examined the correlation between leisure activities and older adults' cognitive function. The study found that a higher level of leisure activity participation linked to a lower risk of cognitive function decline. Leisure activity types also matter. Social participation, intellectual activities and outdoor activities were found to be beneficial to maintain older adults' cognitive function. Older adults are encouraged to be engaged in those types of leisure activities to prevent cognitive function decline.

Keywords: older adults, CLHLS, cognitive function, leisure activity.

1   Introduction

When studying leisure activities, there is not a consistent definition for 'leisure activity'. Most studies defined it as activities completed during leisure time[14]. According to the above definition, it is hard to determine whether physical activities in leisure time should be considered as physical activities or leisure activities. To further clarify the term of leisure activity, some scholars have defined it as 'leisure-time non-exercise activities', including gardening work, raising domestic animals, reading books or newspaper, playing cards et al. [10] [12] [16]. Prior studies have documented the importance of participating in leisure activities in promoting older adults' health. Previous studies of leisure activities and older adults' health have some important findings.

First, scholars found a significantly positive effect of leisure activities on older adult's SRH [1]. A study on Portuguese seniors found that poor SRH was negatively linked to leisure-time activities [2]. Adjei and Brand (2018) observed a positive relationship between being engaged in leisure housework activities and self-reported health status among seniors. Secondly, it was found that participating in leisure activities helps to maintain older adults' cognitive function[3] [8] [9]. For instance, researchers showed that older adults who frequently attended religious and social activities had better cognitive function than those who seldom attended such activities [2]. Zhang and colleagues (2022) also suggested that the habit of reading helped to maintain cognitive

function among Chinese elders. In addition, a higher level of leisure activity participation has also been shown to be able to improve older adults' psychological well-being [5] [11]. Zhang and associates (2022) showed that the more often older adults read books and newspapers, the better the SRH and the lower the risk of developing depressive symptoms among older adults [15].

Besides the above studies, prior literature also explored how different forms of leisure activities affected seniors' health status. According to Bum and associates (2020), there are three types of leisure activities based on the sociality level: active, passive, and social activities. They contended that passive leisure activity participants had relatively lower scores of health measures than the other two groups[4]. Active leisure activity participants had the highest physical health scores. But there were no statistically significant differences in levels of psychological health and happiness among seniors who participated in active, passive, and social leisure activities. Other researchers further classified leisure activities into two categories: voluntary and cultural and sports. Voluntary leisure activities were shown to be able to alleviate the difficulties in instrumental activity of daily living (IADL); cultural and sports related leisure activities were found to be effective in reducing depression and difficulties in activity of daily living (ADL) [4] [6].

The existing studies have largely enriched our understanding on leisure activities and older adults' health. However, previous studies also have some limitations. First, the majority of the existing studies focused on Western elders and not much research has been done on Chinese elders regarding this topic. Second, most prior studies used the measure "whether or not participated in leisure activities" to study the impact of participating in leisure activities on older adults' health. We know very little in terms of the effects of specific leisure activities on older adults' health. Thus, this study aimed to focus on Chinese older adults aged 65 years and above to carry out the analysis. The study used the 2011 wave of the Chinese Longitudinal Health and Longevity Survey (CLHLS), a nationally representative data, to evaluate how various types of leisure activities are linked to older adults' cognitive function.

2   Data, Measures and Methods

2.1   Data

The study used data from the 2011 Chinese Longitudinal Healthy Longevity Survey (CLHLS). The survey was conducted in randomly selected half of the counties/cities in 22 provinces of China. Since the survey was initially launched to meet the needs for scientific research on the oldest old, the dataset provided an excellent source for studying Chinese oldest old. It was pointed out that persons who reported age 106 or higher were considered as invalid cases [13]. Thus, persons aged 106 and higher were dropped in this study due to their extremely high age. The study obtained 9,679 oldest old aged 65 to 105.

2.2   Measures

Health Measure.

Cognitive function of the respondent is measured by using the Chinese version of the Mini-Mental State Examination (MMSE). The MMSE is adapted from Folstein, Folstein, and McHugh [7] and tests four aspects of cognitive functioning: orientation, calculation, recall, and language. The total possible score on the MMSE is 30, with lower scores indicating poor cognitive ability. Responses of ''unable to answer'' are coded as incorrect answers. This study coded the cognitive function measure as a dichotomous variable. Those whose cognitive function scores are 24 and above were coded as "1", indicating a sound cognitive function. Those whose cognitive function scores are below 24 were coded as "0", suggesting cognitive impairment.

Leisure activity measure.

The measure of leisure activities relies on the survey question asking whether the respondent participated in any leisure activities on a daily basis. The activities included: 1) reading newspapers/books, 2) raising domestic animals, 3) playing cards and/or mahjong, 4) watching television and/or listening to radio, 5) gardening work, 6) social activities, 7) travelling, and 8) physical activities in leisure time. For the first five measures, the respondent was asked about the frequency of attending the activity with "1" indicating the lowest frequency and "5" the highest. The seventh one was coded as a continuous variable, measuring number of times the respondent travelled in the past year. The last one was coded as a dichotomous variable with "1" indicating participating physical activities and "0" if otherwise.

Control variables.

The respondent's demographic and socioeconomic characteristics were controlled, including age, gender, rural/urban residence, ethnicity, marital status, living arrangements (whether living alone), education, occupation before retirement and per capita household income. The study also controlled for the respondent's physical health status, such as ADL, chronic diseases and SRH. The elder's health lifestyle patterns are also controlled, including eating fruits and vegetables, smoking and alcohol consumption. Descriptive results for all variables (except for the leisure activity variables) are presented in Table 1. Since leisure activity variables are the main independent variables, the descriptive information for leisure activity variables are presented separately in Table 2.

2.3   Methods

Descriptive analysis was used to report means and percentage distributions of all variables. Since the cognitive function measure was coded as a dichotomous variable, logistic regression was used to predict the impact of leisure activities on older adults' cognitive function.

3   Results

3.1   Descriptive statistics

Table 1 showed descriptive results for all variables. Of the 9,679 respondents aged 85 to 105, 71.0% of them show sound cognitive function. The percentage share of urban respondents was lower than that of rural ones (47.3% and 52.7%, respectively). The mean age of the sample was 86. The SES of the studied sample appeared to be low. On average, the years of schooling among studied sample was 2.3. The mean household per capita income for the year before the survey was 24,869 RMB (which is equivalent to 3,552.7 USD with 1 USD =7 RMB). Only about 7.5% of the studied sample reported having professional jobs before retirement. In terms of the physical health status of the respondent, the results showed that 26.4% and 22.2% of the respondents had ADL difficulties and chronic diseases, respectively. The mean self-rated health score was 3.4 out of 5. As to health lifestyles, the results demonstrated that about 17.9% and 17.1% of the respondents claimed themselves as a smoker and a drinker, respectively. Over half of the respondents reported that they ate vegetables almost every day. Close to 50.0% of the respondents ate fruits almost every day or almost every week. These data suggested a fairly healthy dietary habits of Chinese elders.

Table 1. Descriptive Results for All Variables: Chinese Aged 65 to 105

Variable	(%)
Dependent variable	
Sound cognitive function	71.0
Control Variables	
Demographic characteristics	
Male	45.0
Urban	47.3
Minority	5.9
Married	38.2
Lived with family members	80.9
Age(mean)	86.0
Socioeconomic factors	
Year of schooling (mean)	2.3
Professional job before retirement	7.5
Family per capita income(RMB)	24,869
Health status	
Had ADL difficulties	26.4
Had chronic diseases	22.2
Self-rated health (mean)	3.4
Health lifestyle measures	
Being a smoker when surveyed	17.9
Being a drinker when surveyed	17.1
Fruits consumption	

Almost everyday	13.6
Almost every week	23.8
Sometimes	35.3
Seldom or never	27.3
Vegetable intake	
Almost everyday	56.1
Almost every week	31.5
Sometimes	8.6
Seldom or never	3.8

Note: some sub-categories may not add up to 100% due to rounding.

Source: Chinese Longitudinal Healthy Longevity Survey (CLHLS) 2018 data.

Table 2 presented the descriptive results for leisure activity variables. About 80.0% of the respondents did not engage in activities such as gardening, raising dogs/cats, reading books, playing cards/mah-jong or social activities. In contrast, Chinese elders intended to participate in outdoor activities, watch TV or listen to radio. For example, about 42.5% of the responsents calimed that they participated in outdoor activities almost every day. Around 52.5% of the respondents listened to radio almost every day. Physical activities were also favored by elders. The number of times elders went out for travelling during the past two years was low with a mean value of 0.3.

If the respondents were broken down to two groups based on their cognitive function, the results showed that for almost every leisure activity measure, the participating rates among elders with sound cognitive function were higher those of elders with impaired cognitive function. As compared to other types of leisure activities, playing cards/mah-jong and participating in social activities seem to have a weaker link with older adults' cognitive function. The Pearson correlation coefficients showed that except for traveling and participating in physical activities, all other types of leisure activity measures had positive associations with older adults' cognitive function. That is, the higher the rate of participating in leisure activities, the higher the likelihood of having sound cognitive function. Based on the correlation coefficients, watching TV and listening to radio had stronger correlations with older adults' cognitive function, followed by outdoor activities, reading books/newspapers, and playing cards/mah-jong.

Table 2. Descriptive Results for Leisure Activity Variables: Chinese Aged 65-105

Leisure activity variables	All sample(%)	Sound cognitive function(%)	Cognitive impairment (%)
1)Outdoor activities			
Almost every day	42.5	54.1	29.1
Once a week	9.8	11.1	9.7
Once a month	2.4	2.6	2.6
Seldom	5.4	5.0	6.9
Never	39.9	27.2	51.7
2)Gardening, raising dogs/cats			
Almost every day	13.6	18.9	6.8
Once a week	2.6	3.4	1.4

Once a month	1.1	1.6	.6
Seldom	2.3	2.8	2.0
Never	80.4	73.3	89.2
3)Reading books/newspaper			
Almost every day	11.2	16.7	2.6
Once a week	3.8	4.5	1.3
Once a month	1.4	2.1	.4
Seldom	3.7	5.2	1.3
Never	79.8	70.4	94.4
4)Playing cards/mah-jong			
Almost every day	6.1	9.0	2.1
Once a week	4.2	6.2	1.6
Once a month	1.6	2.4	.4
Seldom	3.6	5.0	1.7
Never	84.4	77.4	94.2
5)Watching TV/listening to radio			
Almost every day	52.5	68.5	31.1
Once a week	9.3	9.1	10.6
Once a month	2.6	2.7	3.0
Seldom	4.5	4.1	6.4
Never	31.1	15.5	48.9
6)Engaging in social activities			
Almost every day	2.9	4.4	.6
Once a week	2.0	3.0	.6
Once a month	1.8	2.4	.9
Seldom	7.2	9.9	3.3
Never	86.1	80.3	94.6
7)# of times travelling in past two years (mean)	.3	.3	.1
8)Engaging in physical activities			
Yes	33.2	41.4	23.0
No	66.8	58.6	77.0

Note: some sub-categories may not add up to 100% due to rounding.
Source: Chinese Longitudinal Healthy Longevity Survey (CLHLS) 2018 data.

3.2 Regression results

Table 3 presented the logistic regression results when predicting the respondent's cognitive function. Models 1 and 2 showed the regression coefficients without and with control variables, respectively. According to model 1, the findings showed that except for travelling and physical exercise, all other leisure activity variables showed significantly positive effects on older adults' cognitive function. These findings indicated that participating in leisure activities are beneficial to older adults' cognitive function. After

controlling for a variety of factors in model 2, the findings showed that travelling and physical activities still had non-significant effects on cognitive function. Meanwhile, the positive effect of gardening and raising dogs/cats on cognitive function disappeared. But the significant effects of all the other leisure activity variables remained significant. These results suggested that with the outdoor activity increasing one level, the likelihood of older adults having sound cognitive function increased by 7.0%. Similarly, with the levels of reading books, playing cards/mah-jong, watching TV, listening to radio, participating social activities increasing by one unit, the likelihood of older adults' having sound cognitive function increases by 16.0%, 20.0%, 16.0% and 15.0%, respectively. The above leisure activities that showed significant effects on older adults' cognitive function may be categorized into three groups: intellectual activities (such as reading, playing cards/mah-jong, watching TV, listening to radio), outdoor activities and social activities.

Table 3. Logistic Regression Results on Cognitive Function: Chinese Aged 65-105

Variables	Model 1	Model 2
Independent variables		
Outdoor activities	.17***	.07***
Gardening	.09***	.03
Reading books/newspaper	.34***	.16***
Playing cards/mah-jong	.30***	.20***
Watching TV/listening to radio	.33***	.16***
Participating in social activities	.23***	.15**
# of times travelling	.07	.02
Physical activities	-.01	-.06
Control variables		
Male		.33***
Urban residence		.04
Minority		-.33*
Married		.40***
Age		-.07***
Lived with others		-.35***
Year of schooling		.09***
Had professional job before retirement		-.11
Logged form of household per capita income in last year		.09**
Had ADL difficulties		-.80***
Had chronic diseases		-.25**
Self-rated health		.16***
Smoking		-.05
Drinking alcohol		-.10
Frequently consumed fruits		.13***
Frequently consumed vegetables		-.01
_cons	-2.07	3.97***
N	7810	5780
Pseudo R2	.17	.28

$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$

As to the effects of control variables, the results showed that males, Han majority, and individuals who were married, had better SRH and who had higher educational attainments and income tended to have non-impaired cognitive function. In contrast, females, older age, having ADL difficulties and living with family members negatively linked to older adults' cognitive function. Smoking and alcohol consumption did not show significant effects on older adults' cognitive function. Frequent consumption of fruits also showed beneficial effects on older adults' cognitive function.

In sum, findings of this study emphasized that intellectual, social and outdoor activities had significantly positive effects on Chinese older adults' cognitive function. Such positive effects are independent of the effects of demographic, socioeconomic and other factors. In addition, the study showed that healthier lifestyles and better health and socioeconomic status are also beneficial to older adults' health.

4   Conclusion

Through analyzing sample aged 65 to 105 from data of the CLHLS 2011 wave, the research examined the relationship between leisure activities and Chinese older adults' cognitive function. The study differentiated leisure activities into various types and highlighted that intellectual, social and outdoor activities are beneficial to maintain older adults' cognitive function. These findings provide evidence to health professionals and older adults' caregivers that certain leisure activities should be promoted to prevent cognitive function deterioration.

The study also had important policy implications. Local governments and communities may launch more intellectual, social and outdoor activities in future. More senior training and educational programs should be made available to older adults. Local communities may also launch volunteer programs that teach seniors using the internet. Volunteers may also read newspapers and books for those illiterate seniors. Facilities should be built to ease seniors' having outdoor activities as well.

The study had limitations. First, the research was not able to exhaust all possible leisure activity measures due to limited CLHLS survey questions. In addition, the study relied on a cross-sectional dataset to conduct the analysis. The changing patterns of leisure activities and older adults' cognitive function have not been examined. Since one's cognitive function is in a changing status, one's cognitive function may change from heavily impaired to mildly impaired. Or one's cognitive function may change from mildly impaired to heavily impaired. Thus, future research may consider using longitudinal dataset to further elucidate the association between older adults' leisure activities and their cognitive function.

Acknowledgments

costs and some local expenses. We also thank the editor and reviewers for their insightful comments and suggestions.

Ethics Statement: All participants signed an informed consent form and agreed to participate in the survey.

Data Availability Statement: The data were released to the researchers without access to any personal data. Data access link: https://charls.pku.edu.cn/.

Conflicts of Interest: The authors declare no conflict of interest.

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