



The longitudinal relationship between income and social participation among Chinese older people

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ABSTRACT

The vital role of active social participation in older people's lives is widely acknowledged. The maintenance of adequate levels of social participation is an essential element of successful aging. Low income may inhibit older people from engaging in social activities. Given its recent rapid economic growth, China provides a unique setting for the study of changes in income and social participation among older people over time. In this study, the longitudinal relationship between income and social participation among Chinese older people was investigated using a nationally representative dataset from three waves of the China Health and Retirement Longitudinal Study (CHARLS). At baseline, a total of 3863 participants with a mean age of 60.4 years (range: 50-89) were included in our study; 49.9% of the participants were female, and 64.4% lived in rural areas. Generalized estimating equations were used to analyze the longitudinal relationship between income and social participation, with and without adjustment for background variables (age, gender, marital status, educational level, empty-nest status, area of residence, and multimorbidity). The results of unadjusted and adjusted analyses clearly showed a longitudinal association between income and social participation. People from the highest income group were almost two times more likely to participate in social activities than were those from the lowest income group. People with a higher educational level are also more likely to participate in social activities compared to people with a lower educational level. Being married and living with children decreased the odds of social participation. Social participation is also less likely among older aged and those living in rural areas. Our findings indicate that higher income levels are associated positively with social participation over time among older people in China.

1. Introduction

The vital role of active social participation in older adults' lives is acknowledged widely and is receiving increasing research attention (Wang et al., 2019). Social participation can be conceptualized as "a person's involvement in activities that provide interaction with others in society or the community" (Levasseur et al., 2010, p. 2148). An extensive body of literature confirms that social engagement is associated positively with better health (Bourassa et al., 2017; Ma et al., 2020), quality of life (He et al., 2017), life satisfaction (Hornby-Turner et al., 2017; Ponce et al., 2014), well-being (Holmes & Joseph, 2011;

Hornby-Turner et al., 2017; Zhang & Zhang, 2015), and less depressive symptoms (Shang, 2020) in later life. The maintenance of adequate levels of social participation is an essential element of successful aging (Douglas et al., 2017; Zhang & Zhang, 2015). Low levels of social participation, on the other hand, increase the risk of mortality, with an effect comparable to those of smoking and alcoholism and potentially greater than that of physical inactivity (Holt-Lunstad et al., 2010). Thus, the identification of factors associated with active social participation among older adults is essential.

Evidence suggests that poverty and low incomes inhibit people's engagement in social activities (Atkinson & Marlier, 2010; Curvers et al.,

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2018; Ferragina et al., 2017; He et al., 2017; Lancee & Van de Werfhorst, 2012; Luo et al., 2020; Mood & Jonsson, 2016). Notably, poverty is a multi-dimensional and complex phenomenon, but income is a crucial aspect of it (Borgeraas & Dahl, 2010). The available theoretical and empirical evidence is, however, mainly derived from Western populations. For example, a longitudinal study using registry data showed that poverty had adverse social consequences among older Swedish people (Mood & Jonsson, 2016). Impoverished people may not be able to afford the expenses of social activities, such as club membership fees, material items required for leisure activities, and the costs of dining out or hosting dinner parties due to a lack of income (Callan et al., 1993; Scharf et al., 2005). Poverty entails a greater risk of exclusion from social life (Scharf et al., 2005), which in combination with the shame associated with the inability to live a decent life leads ultimately to reduced social participation (Sen, 1983). Although researchers believe that the mechanisms underlying associations between poverty and social consequences are similar across countries, this assumption is open to debate until comparable longitudinal studies are conducted internationally (Mood & Jonsson, 2016). A cross-sectional study conducted in 24 European countries showed that income had a stronger negative influence on individuals' social participation in more unequal societies (Lancee & Van de Werfhorst, 2012). Furthermore, given that the patterns of and perspectives on social participation can differ markedly among settings, more research is needed to understand the association between income and social participation in non-Western countries.

China has had the second-largest economy in the world since 2010 (Ren, 2016); together with rapid population aging (Fang et al., 2015) and economic inequality (Zhang & Bao, 2015), China's unprecedented economic growth and the accompanying pattern of social development provide a fascinating setting for scientists' study of the relationship between changes in income and social participation over time. During 1981–2013, China's national poverty headcount dropped at a rate of approximately 12.84% per year (Yang & Mukhopadhyaya, 2019). The average household income in the country has increased dramatically in the 21st century (Chamon et al., 2013). However, this rapid economic growth has had social consequences (Banister et al., 2012), such as imbalances in economic development (e.g., between rural and urban areas) (Su et al., 2012). This inequal development has contributed to Chinese adult children's movement away from their natal areas (i.e., villages, townships, and cities), leaving their aging parents as "empty nesters" at home (Fang et al., 2015; Zhang & Zhang, 2017). Research has shown, however, that Chinese empty-nester older adults are more socially active than are their non-empty-nester peers (Zhang et al., 2018). A possible explanation is the traditional Chinese cultural expectation that older people spend time with their families at home (Rochelle & Shardlow, 2012), such as by taking care of young children, before taking part in social (e.g., community) activities outside of the family sphere (Zhang et al., 2018). Marital status may also influence social activity levels, as people living with spouses may be less likely to engage in social activities outside of the home than are older persons with no spouse, although the findings on this topic are mixed (Bukov et al., 2002; Utz et al., 2002).

Social participation also differs with respect to other background characteristics. With increasing age, older adults may lose their spouses/partners and friends, which increases the risks of having narrower social networks and experiencing social isolation (Dawson-Townsend, 2019; Van Hees et al., 2020). More-educated people have reported higher levels of social participation (Ang, 2019) and the positive influence of education is known to persist into old age (Gesthuizen, 2006), although gender differences in these effects exist. Females are usually more socially active than males (Ang, 2019). Similarly, urban older adults in China reported significantly more social participation than did their rural counterparts (Guo et al., 2018; Lin, 2017). Furthermore, social participation has been reported to differ between people with and without (multi)morbidity (Galenkamp & Deeg, 2016). Chronic conditions tend to be associated with functional disability, which has been

shown to be among the greatest obstacles to social participation among older adults (Van Hees et al., 2020). Because (multi)morbidity, empty-nest status, marital status, and other relevant background characteristics, such as age, gender, level of education, and rural or urban residence, impact people's ability to participate in social activities (Bukov et al., 2002; Curvers et al., 2018; Guo et al., 2018), they must be taken into account to avoid bias in examinations of the relationship between income and social participation.

Longitudinal studies investigating this relationship among Chinese older adults with consideration of background variables are lacking. Not until very recently have researchers begun to assess the relationship between pension amounts and social participation among Chinese older adults (Zhu & Walker, 2019); they failed to find an association, but they did not examine total income. According to the 2010 Chinese census, nearly half of older adults' (age ≥ 65 years) incomes comes from family members; 25% comes from pensions and 20% comes from labor (Jiang et al., 2016). In addition, Zhu and Walker (2019) did not take relevant characteristics of Chinese older people into account; thus, the contribution of their finding to our understanding of the influence of total income on Chinese older adults' social participation is limited. Thus, we conducted this study to investigate the longitudinal relationship between total household income (adjusted for household size) and social participation among Chinese older adults while taking (multi)morbidity, empty-nest status, and relevant background characteristics into account. The following research questions were investigated to achieve this goal:

- (1) Is higher household income associated with social participation among older Chinese adults over time (with and without adjusting for covariates)?
- (2) In addition to household income, what is the relationship between background characteristics and social participation among older Chinese adults?

2. Methods

2.1. Participants and data

This study was conducted with data from the China Health and Retirement Longitudinal Study (CHARLS), which had a nationally representative sample of non-institutionalized Chinese people aged ≥ 45 years (Sun et al., 2018). The baseline survey (wave 1) was conducted between June 2011 and March 2012 with 17,708 participants, and follow-up surveys were conducted every year thereafter (Zhao et al., 2013, pp. 1–56). CHARLS was designed to have a better understanding of the social determinants and consequences of ageing. It includes a variety of information about demographics, economic status, physical and psychological health, and social participation among older adults in China (Beaumaster et al., 2018). The initiative of creating a Harmonized CHARLS dataset was to facilitate a more accessible and user-friendly version of the datasets, also, to increase the comparability of ageing-related studies around the world, such as Harmonized Health and Retirement Survey (HRS) in the United States, Harmonized JSTAR (Japan), and Harmonized SHARE (Europe and Israel) (Beaumaster et al., 2018). Currently, there are 4 waves of data available in CHARLS: the year 2011 (wave 1), the year 2013 (wave 2), the year 2014 (wave 3: life history study), the year 2015 (wave 4). The harmonized CHARLS dataset contains the newest available waves of CHARLS data (wave 1, wave 2, wave 3, wave 4) (Beaumaster et al., 2018). In wave 1, 2 and 4, community residents were asked to report their demographics, family information, social connections, health status, household income, individual income. Therefore, we included waves 1, 2, 4 of the Harmonized CHARLS data in our analysis. Wave 3 was not included in our analysis because it contains life history data only and does not contain variables such as household income and social participation, which therefore does not fit our criteria for analysis. CHARLS has been described in detail elsewhere (Zhao et al., 2013, pp. 1–56). For more

detailed information about the Harmonized CHARLS data, please refer to: www.g2aging.org.

In line with the World Health Organization's Study on Global Ageing and Adult Health, we used 50 years of age as the cut-off for this study of older persons (Kowal et al., 2012). After the elimination of cases with missing values for background characteristics, total household income and social participation, the final sample comprised 3863 older people.

2.1.1. Exclusion criteria

i) people age <50 years; ii) respondents with missing data on background characteristics at baseline; iii) respondents with missing data on household income variable (all three waves); and iv) respondents with missing data on social participation (all three waves). The reasons for exclusion are summarized in Fig. 1.

2.1.2. Ethical approval

The CHARLS team obtained ethical approval for the research from the Ethics Committee of Peking University. All participants provided written informed consent (Zhao et al., 2013, pp. 1–56).

2.2. Variables

2.2.1. Social participation

In CHARLS, the notion of social participation was operationalized by asking participants whether they had interacted with (a) friend(s); played mah jong, chess, or cards or gone to a community club; gone to a sporting event or participated in a social group or other type of club; engaged in the activities of a community-related organization;

conducted volunteer or charity work; or attended an educational or training course in the past month. The social participation variable was dichotomized, with 0 indicating no participation in a social group or activity and 1 indicating participation in any of the social activities in the past month.

2.2.2. Household income per capita

In China, labor income, pension, and income transfer from family members are the most common types of income for older adults (Zhu & Walker, 2019). The total household income variable included a wide range of income sources, such as labor (e.g., wages), capital (e.g., self-employment, assets, and rental), pensions, government subsidies (i. e., welfare), and other household members, for the past year. Following Wang and Tapia Granados (2019), we calculated annual household income per capita by dividing the household income by the number of people in the household, followed by quintile ranking (lowest, lower, middle, higher, highest) based on wave 1 data, with the lowest income quintile serving as the reference group. Adjustment for the number of household members is important because a large proportion of older adults had more than one child due to the lack of strict enforcement of the national one child policy in rural China (Chen et al., 2020).

2.2.3. Covariates

Sociodemographic characteristics included in the analysis were age, gender (0 = female, 1 = male), marital status (0 = single [separated, divorced, widowed, or never married], 1 = married [married or partnered]), residence (0 = urban, 1 = rural), and level of education. Age (in years) was calculated according to the respondents' birth years. For the

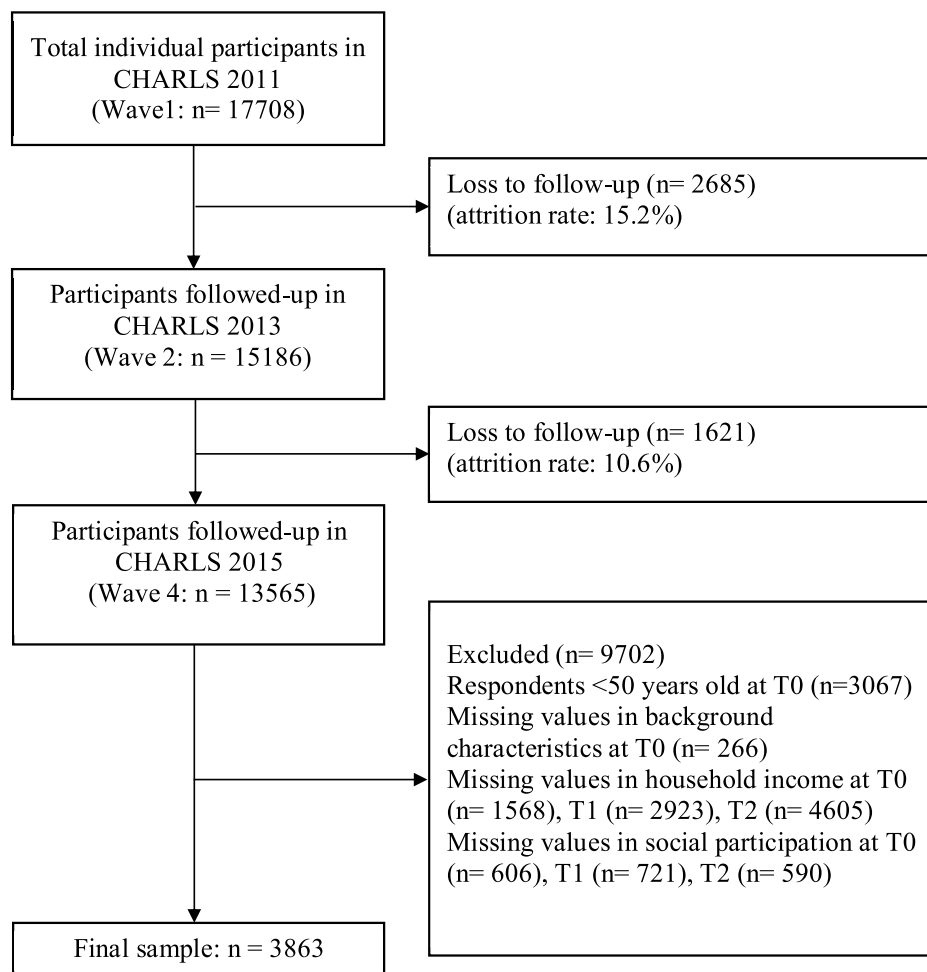


Fig. 1. Flow chart on how the final sample (n = 3863) was derived.

classification of educational levels, which is based on a simplified version of the 1997 International Standard Classification of Education codes (UNESCO Institute for Statistics, 2012; www.uis.unesco.org); 1 indicated a low educational level (less than lower secondary education), 2 indicated a medium educational level (upper secondary and vocational training), and 3 indicated a high educational level (tertiary education).

2.2.3.1. Empty-nest status. Following Duan et al. (2017), we defined empty-nester older adults as those who lived alone or with spouses/partners, but with no child (code = 1), and non-empty-nester older adults as those who lived with (a) child (ren) (code = 0).

2.2.3.2. (Multi)morbidity. Respondents were asked if they had ever had high blood pressure, diabetes, cancer, lung disease, heart problems, stroke, psychiatric problems, arthritis, dyslipidemia, liver disease, kidney disease, stomach/digestive disease, asthma, or memory-related disease. We constructed a (multi)morbidity variable with 0 indicating no chronic disease, 1 indicating one of these diseases, and 2 indicating multimorbidity (two or more diseases).

2.3. Statistical analysis

Descriptive statistics were calculated for all variables; continuous variables are reported as means with standard deviations (SDs), and dichotomous and categorical variables are reported as numbers and percentages. To investigate the longitudinal relationship between household income and social participation over time, we used a longitudinal linear regression approach, generalized estimating equations (GEEs) (Liang & Zeger, 1986; Twisk et al., 1996) with an exchangeable correlation structure. In GEE models, the associations between different variables at different time points were tested simultaneously (Twisk et al., 1996). This means that a regression coefficient obtained in GEEs is a ‘combined (pooled)’ coefficient which incorporates both within-subject (longitudinal effects) and between-subject relationships (cross-sectional effects) (Twisk, 2004). In other words, the obtained coefficients in GEEs are the average value of individual regression lines, which reflect the ‘population average’ longitudinal relationship between the parameters involved in the model (Twisk et al., 1996; Zeger, 1988, pp. 1049–1060).

In our study, the relationships between household income and social participation were analyzed not only with the correction for time (three waves), but also adjusted for baseline potential confounders such as levels of education.

We first calculated crude odds ratios (ORs), and then adjusted for baseline covariates (individual sociodemographic characteristics, [multi]morbidity, and empty-nest status). Also, collinearity diagnostics revealed that the Variance Inflation Factor (VIF) did not exceed the recommended value of 10 (O’Brien, 2007). Therefore, there were no collinearity problems among variables included in our study. The total number of observations involved in our analysis were 11,589 observations (3863 individuals were repeatedly measured across three waves).

All statistical tests were two sided, with $p < 0.01$ considered to represent significance. The data were analyzed using SPSS software (version 24; IBM, Armonk, NY, USA).

3. Results

Table 1 presents background characteristics of the study participants. At baseline, the mean age of the 3863 participants was 60.4 (SD = 7.03) years; 49.9% of the participants were female, 64.4% lived in rural areas, and most (87.9%) respondents were married. Only 11.0% of the respondents had finished high school or vocational school. About half of the respondents were empty-nesters, and 43.6% reported having two or more diseases. The percentage of respondents in the highest income

Table 1

Participant characteristics ($n = 3863$, 2011–2015).

	T0	T1	T2
<i>Background characteristics</i>			
Age in years, mean (SD, range)	60.4 (7.0, 50–89)		
Females, number (%)	1926 (49.9)		
Married, number (%)	3397 (87.9)		
Rural residence, number (%)	2487 (64.4)		
Level of education, number (%)			
Low	3440 (89.0)		
Medium	378 (9.8)		
High	45 (1.2)		
Empty-nest, number (yes, %)	1985 (51.4)		
(Multi)morbidity, number (%)			
No	1078 (27.9)		
1 disease	1100 (28.5)		
≥2 diseases	1685 (43.6)		
<i>Total household income per capita, number (%)</i>			
Lowest quintile	689 (17.8)	855 (22.1)	1202 (31.1)
Lower quintile	818 (21.2)	776 (20.1)	871 (22.5)
Middle quintile	828 (21.4)	624 (16.2)	454 (11.8)
Higher quintile	776 (20.1)	725 (18.8)	552 (14.3)
Highest quintile	752 (19.5)	883 (22.9)	784 (20.3)
Social participation (active, %)	1819 (47.1)	2021 (52.3)	1774 (45.9)

SD, standard deviation; T0, baseline; T1, 2-year follow-up; T2, 4-year follow-up.

category was greater at T1 (22.9%) than at T0 (19.5%), but had decreased at T2 (20.3%). Similarly, the percentage of socially active participants was greater at T1 (52.3%) than at T0 (47.1%), but had decreased at T2 (45.9%; [Table 1](#)).

Table 2 shows the results (crude odds ratios) of GEE models for the longitudinal associations between household income and social participation. **Table 2** clearly shows that higher household income is positively associated with higher levels of social participation among older Chinese adults over time (without adjusting for covariates). Individuals in the lower income quintile had 1.155 times higher the odds of being socially active than among those in the lowest income quintile (95% confidence interval [CI] = 1.082–1.233, $p < 0.001$). The odds of participation in social activities were 1.217 times greater among people with incomes in the middle category than among those in the lowest income category (95% confidence interval [CI] = 1.137–1.302, $p < 0.001$). The odds of participation in social activities were 1.550 times greater among people with income in the higher income category than among those in the lowest income category 95% confidence interval [CI] = 1.451–1.656, $p < 0.001$). Overall, higher income levels were associated significantly with active social participation over time, with the highest quintile of income showing the strongest association (OR = 1.969, 95% confidence interval [CI] = 1.842–2.105, $p < 0.001$).

Table 3 shows the GEE models’ results for the longitudinal associations between household income and social participation (adjusted for baseline covariates). After adjusting for age, gender, marital status, residence, level of education, empty-nest status, and (multi)morbidity status, results show that higher levels of household income were still clearly associated with active social participation over time. The odds of

Table 2

Effects of income on social participation in 2011–2015, as determined by a standard generalized estimating equation ($n = 3863$).

	Crude odds ratio (95% CI)
<i>Total household income per capita</i>	
Lowest quintile (ref)	–
Lower quintile	1.155 (1.082–1.233) **
Middle quintile	1.217 (1.137–1.302) **
Higher quintile	1.550 (1.451–1.656) **
Highest quintile	1.969 (1.842–2.105) **

CI, confidence interval. Significance levels: * $p < 0.01$, ** $p < 0.001$.

Table 3
Effects of income on social participation in 2011–2015, as determined by a standard generalized estimating equation ($n = 3863$).

	Social participation OR (95% CI)
<i>Background characteristics</i>	
Age in years, mean (SD)	0.990 (0.987–0.993) **
Gender (male)	0.983 (0.932–1.037)
Marital status (married)	0.848 (0.779–0.923) **
Residence (rural)	0.888 (0.838–0.941) **
<i>Level of education</i>	
Low (ref)	–
Middle	1.582 (1.440–1.737) **
High	1.894 (1.539–2.331) **
Any child co-residence (yes)	0.913 (0.863–0.966) *
<i>(Multi) morbidity</i>	
No (ref)	–
1 disease	0.989 (0.924–1.058)
≥2 diseases	1.069 (1.003–1.139)
<i>Total household income per capita</i>	
Lowest quintile (ref)	–
Lower quintile	1.158 (1.082–1.240) **
Middle quintile	1.168 (1.088–1.254) **
Higher quintile	1.469 (1.369–1.576) **
Highest quintile	1.726 (1.604–1.858) **

OR, odds ratio; CI, confidence interval; SD, standard deviation. Significance levels: * $p < 0.01$, ** $p < 0.001$. Analyses were adjusted for baseline age, gender, marital status, residence, educational level, empty-nest status, and (multi) morbidity.

participation in social activities were 1.158 times greater among people with incomes in the lower income category than among those in the lowest income category (95% CI = 1.082–1.240, $p < 0.001$). The odds of participation in social activities were 1.168 times greater among people with incomes in the middle quintile than among those in the lowest income category (95% CI = 1.088–1.254, $p < 0.001$). The odds of participation in social activities were 1.469 times greater among people with incomes in the higher category than among those in the lowest income category (95% CI = 1.369–1.576, $p < 0.001$). The odds of participation in social activities were 1.726 times greater among people with incomes in the highest 20% than among those in the lowest income category (95% CI = 1.604–1.858, $p < 0.001$).

Results displayed in Table 3 also reveal the associations between baseline background characteristics and social participation among older Chinese adults. At baseline, a one-unit increase in age was associated with a one percent decrease in the likelihood of being socially active (OR = 0.990, 95% CI = 0.987–0.993, $p < 0.001$). Less participation in social activities was reported by married people (OR = 0.848, 95% CI = 0.779–0.923, $p < 0.001$) and people living in rural areas (OR = 0.888, 95% CI = 0.838–0.941, $p < 0.05$). The odds of being socially active were 1.582 times greater among people with middle education levels than among those with low levels of education (95% CI = 1.440–1.737, $p < 0.001$); the odds of being socially active were 1.894 times greater among people with high education levels than among those with low levels of education (95% CI = 1.539–2.331, $p < 0.001$); the odds of being socially active were 1.582 times greater among people with middle education levels than among those with low levels of education (95% CI = 1.440–1.737, $p < 0.001$). Participants living with children tended to be less socially active than empty-nesters (OR = 0.913, 95% CI = 0.863–0.966, $p < 0.01$). Gender and multimorbidity were not associated with social participation.

4. Discussion

To our knowledge, this study is the first to investigate the longitudinal association between total household income and social participation among Chinese older people with consideration of empty-nest status, (multi)morbidity, and background characteristics. Its results contribute to our understanding of the longitudinal effects of income

status on social participation among Chinese older people.

We found that higher total household incomes were associated with active social participation over time (in both adjusted and unadjusted GEE models), in line with the finding from a recent longitudinal study that poverty negatively influenced older Swedish adults' social participation, although that association was weak (Mood & Jonsson, 2016). No longitudinal Chinese data are available for direct comparison with our results. We do note, however, that as Chinese culture is strongly collectivistic, the core unit of survival is the group (Hui & Yee, 1994). In collectivist cultures, people depend on each other; individualistic cultures (e.g., those in Western countries) are characterized by more detachment from groups, more distance among people in groups, and greater self-reliance (Triandis et al., 1988), with the main foci of individual uniqueness and independence (Oyserman & Lee, 2008). The relationship between income and social participation has been the primary focus of only one cross-sectional Chinese study (Zhu & Walker, 2019), which revealed no such association among Chinese older adults. In addition to our longitudinal design, our study extends Zhu and Walker's (2019) research in several ways. First, those researchers focused only on pensions, which typically comprise about 25% of older adults' total incomes (although substantial rural/urban differences exist) (Jiang et al., 2016). In the present study, we included various main sources of income. Furthermore, Zhu and Walker (2019) did not take empty-nest status and multi (morbidity) into account. These factors may significantly influence older adults' social participation (Galenkamp & Deeg, 2016; Zhang et al., 2018) and deserve careful consideration, as they may introduce bias into the observed association between income and social participation. The present study demonstrated that income has a critical effect on the social engagement of older adults in a highly collectivistic culture over time.

Nevertheless, caution is warranted when interpreting our findings because not all social activities cost money. For example, since the last decade, public square dancing (*guang chang wu*) has become one of the most popular group-oriented activities in China, and it is openly supported by the Chinese government (Seetoo & Zou, 2016). The majority of dancers are from low- and middle-class families (Lin et al., 2019). Thus, for those in the lowest- and lower-income groups, lower incomes themselves might not be the most fundamental reason for the lack of social participation. Impoverished people's lesser social engagement may be related more to the "side effects" of being poor, such as depression (Cheung & Chou, 2019; Saito et al., 2014). We encourage the performance of additional studies to further explore the obstacles to social activity participation among poor people.

Besides, the decline in the proportion of respondents in the highest income category between T1 and T2 in this study seems to be at odds with China's rapid economic growth and overall increase in pensions over time (Li et al., 2020). Several possible explanations can be offered for this finding. First, despite the increase in pensions, people receive less money overall after retirement (Feng et al., 2020), many participants (likely including many blue-collar workers) may have reached retirement age at T2. Notably, the pension amount varies greatly among programs in China. For example, the Public Employee Pension program, established for civil servants and people working for public services, provides an average pension replacement after retirement of 80–90% of the pre-retirement wages, whereas the Basic Old Age Insurance program, which was established for formal employees in urban areas and began to include rural migrant workers in 2010, provides only 59.2% of employees' pre-retirement wages as pension (Feng et al., 2020). Furthermore, the retirement age varies according to gender and occupation. For example, the official retirement age for men is 60 years; it is 50 years for women with blue-collar jobs and 55 years for those with white-collar jobs (Feng et al., 2020). Finally, people's total household incomes may have been reduced by investment losses, which were included in the calculation of total household incomes in this study.

We found that significant differences were observed among some background characteristics (age, marital status, residence, level of

education, empty-nest status) and social participation among older adults in China.

As reported in previous studies (Dawson-Townsend, 2019; Desrosiers et al., 2004; Van Hees et al., 2020), older age was associated with inactive social participation among older Chinese adults in this study. Ageing would enhance the risk of shrinking social networks because of the death of peers in the later years of life (Dawson-Townsend, 2019; Van Hees et al., 2020). Also, social participation may not be a priority of older adults anymore (Cachadinha et al., 2011).

As expected, and in line with the results of a cross-sectional Chinese study (Zhang et al., 2018), we found that living with children negatively impacted Chinese older people's social participation over time. In traditional Chinese culture, older adults are expected to engage in family activities, such as taking care of young children (Zhang et al., 2018), which limits non-empty-nesters' time for social activities outside the home. In addition, research has shown that the majority of older Chinese non-empty-nesters have lower incomes and depend financially on their children, which also restricts engagement in social activities (Zhang et al., 2018).

In this study, married status was associated negatively with social participation among Chinese older adults. Previous research has yielded mixed findings, reflecting the complexity of this relationship; a positive association (Bukov et al., 2002) and a lack of association (Utz et al., 2002) among older adults have been reported. Married people may be more likely to participate in social activities because participation with their spouses/partners is more attractive than participation alone (Bukov et al., 2002), but conversely they may need to care for their spouses at home (Utomo et al., 2019). There is no simple explanation for the observed negative association between marriage and social participation in this study. In traditional Chinese culture, aging individuals are expected to take on a contributory family role (Mielde-Mossey et al., 2009). The emphasis on family needs over individual needs has been long embedded in Chinese culture (Xu et al., 2007). For instance, caregiving to close family members, such as spouses, in older age is quite common, and indeed obligatory, in China (Cheng & Chan, 2006, pp. P262-P269; Sun, 2013). A recent Chinese study showed that family responsibility [e.g., taking care of a spouse or (grand)child] can be a barrier to older adults' social participation (Zhu & Walker, 2019); caregiving usually requires considerable time and effort (Pinquart & Srense, 2011; Robison et al., 2009).

The negative association of rural residence with social participation observed among Chinese older people in this study is consistent with previous reports of less social participation among older rural residents than among their urban counterparts in China (Guo et al., 2018; Lin, 2017). Under China's household registration system (*hukou*), rural and urban residents form distinct social classes (Guo et al., 2018). Infrastructure, public facilities, community services, and volunteer organizations are much better developed and more accessible in urban China (Chen & Lu, 2007). As a consequence, opportunities for older adults' social participation differ substantially between rural and urban locations (Guo et al., 2018); consistently, Lancee and Van de Werfhorst (2012) argued that the availability of resources determines participation. In addition, older rural residents in China are usually less financially secure; the average pension for this group in 2010 was approximately USD 13.6/month, which is not nearly sufficient to cover daily needs (Tao, 2016). Because of this lack of income security, Chinese older people in rural areas must continue to work in old age (Guo et al., 2018), and likely allocate their time to work instead of social/leisure activities (Liu et al., 2019). This situation is likely to be context related, as full-time employment was associated negatively with social participation in Germany (Klumb & Baltes, 1999), whereas no association was found in the Netherlands (Van Groenou & Deeg, 2010).

In line with findings from high-income countries (Katagiri, 2012; Van Groenou & Deeg, 2010; Zhang & Wu, 2017), higher educational levels were associated significantly with social participation in this study. According to Gesthuizen (2006), the influence of education is

quite persistent, and may influence people's attitudes toward life into old age. Relative to lower levels, higher education levels are also associated with greater tolerance of social norms and interest in social matters among older adults (Gesthuizen, 2006). In addition to being more likely to engage in healthy behaviors such as social participation, highly educated people are more likely to have stronger social support networks, which encourages their involvement in social activities (Zhang & Wu, 2017).

4.1. Implications and suggestion for future research

We found that higher income levels were associated positively with active social participation over time among older Chinese people. This finding has important implications for income-related policies seeking to improve social participation. We suggest that policies be developed to protect or increase pension income for older Chinese citizens, especially more vulnerable individuals who live in rural areas and have lower levels of education. Although China has made great efforts to optimize its pension system, the average benefit level is still too low to ensure older people's basic living needs (Liu & Sun, 2016). In general, pension income accounts for only about one-fourth of an older person's total income. As a consequence, a majority of older people, and especially those in rural areas, remain financially dependent on their family members (Giles et al., 2010). However, different pension realities coexist in China. Thus, we need to acknowledge that the balancing of pension benefit levels and the coverage amount is challenging. Alternatively, the government could create jobs for older adults or re-evaluate the retirement age, creating more flexibility for those who are still willing to work. This study serves as a first step in understanding the pivotal role of total income among Chinese older adults. We encourage further research to inform the development of policies to enhance older adults' income in sustainable ways.

4.2. Strengths and limitations

The present study has several strengths. First, it is the first study to examine the relationship between income and social participation among Chinese older people over time. Perspectives on and patterns of social participation can differ markedly between collective and individualistic societies; our findings extend our understanding of the longitudinal effects of income on social participation in a strongly collectivist society. Second, our calculation of total household incomes included a wide range of income types for Chinese older adults, which provided a complete picture of participants' actual income status. Third, in addition to its longitudinal design, our study was conducted with a large and geographically diverse sample. Moreover, we included critical potential confounders (e.g., multimorbidity and empty-nest status) in the analytical model to minimize potential bias.

This study has several limitations. First, income might have been underreported, which might introduce bias into the analysis. Significant underreporting of income (e.g., to tax authorities) has been detected among high-income individuals (Molero-Simarro, 2017) and self-employed people (by approximately 25%) (Hurst et al., 2014). However, we used a broad measure of income to minimize the potential risk of underreporting, and we believe that this risk did not affect our general conclusions. Second, we use a dichotomized social participation variable constructed by RAND; although this variable includes six domains of social activity, it may not represent all social activities in China. In addition, we did not measure the frequency of social participation, which should be incorporated into future research. Further, GEEs pooled together both longitudinal and cross-sectional associations into one regression coefficient, which is a strength of this statistical technique. The coefficients obtained from a GEE analysis includes both a between-subject and a within-subject part. The latter reflects the relationship between changes. However, this feature of GEEs also limits the interpretation of the results in the meantime because we are not able to

separate the between-subject and a within-subject parts. Another limitation is that we lacked information on the severity of diseases included in the assessment, which might have influenced the levels of social participation. In addition, participants may have underreported chronic diseases that carry social stigma (e.g., psychiatric problems) in the face-to-face interviews.

5. Conclusions

Taken together, the findings of this study indicate that higher levels of total household income were associated positively with social participation over time among older adults in China. In addition, social participation was affected significantly by background characteristics (e.g., non-married status, urban residence, higher educational level, and empty-nest status).

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Ethical statement

The CHARLS team obtained ethical approval for the research from the Ethics Committee of Peking University. All participants provided written informed consent (Zhao et al., 2013, pp. 1–56).

Declaration of competing interest

None.

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