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How older adults fulfill their retirement plans relates to positive mental health: a path model analysis of social activity and self-esteem

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Abstract
Retirement planning fulfillment is necessary for older adults to adapt to later life and maintain their quality of life. This study investigates the internal mechanisms between retirement planning fulfillment and positive mental health among older adults. 1200 Chinese older adults (M_{age} = 68.49, SD = 7.27; 57% female) completed a questionnaire package measuring retirement planning fulfillment, positive mental health, post-retirement social activities, and self-esteem. Results indicated that older adults in rural areas had significantly lower retirement planning fulfillment than those in urban areas. Retirement planning fulfillment was positively associated with social activity, self-esteem, and positive mental health. Social activities and self-esteem mediated the relationship between retirement planning fulfillment and positive mental health. This study suggests the need for further investigation of retirement planning fulfillment, which helps improve older adults' ability to cope with later life.

Keywords Retirement planning · Plan fulfillment · Older adults · Social activity · Self-esteem · Positive mental health

Introduction

Retirement is regarded as a life event with both positive and negative consequences. Negative consequences include loss of financial stability, reduced social participation, health declining, reduced cognitive functioning, and psychological vulnerability to unpredictable changes (Van Solinge & Henkens, 2007; Shultz & Wang, 2011; Sarabia-Cobo et al., 2020). Positive consequences include decreased work demands and fatigue, increased family involvement, physical and volunteering activities (Pietro Vigezzi et al., 2021; Vanajan et al., 2021; Georganas et al., 2022).

Retirement planning is a process in which individuals make efforts to prepare for their retirement and establish specific and long-term plans for later life (Yeung, 2013). It benefits older adults to cope with the negative consequences of retirement, maintain their quality of life and well-being, and helps to alleviate the pressure on the social security system. As life expectancy increases, the impact of retirement planning on older adults' well-being becomes cumulatively significant. Retirement planning fulfillment is putting specific retirement planning into action, the final phase of retirement decision-making (Feldman & Beehr, 2011). The threshold for retirement planning fulfillment is higher than plan enactment, and it is more challenging to fulfill retirement plans than enact them. Retirement planning that is only enacted but not fulfilled may fail to achieve the goal of improving older adults' later life security.

Current studies mainly focused on retirement planning enactment, but there is a lack of research on retirement planning fulfillment. Measuring the fulfillment of retirement plans and further investigating their outcomes is necessary. This study aimed to investigate the association between retirement planning fulfillment and positive mental health, as well as the mediating roles of social activity and self-esteem among older adults.

Theoretical background

Positive mental health (PMH) is a systematic integration of emotional well-being (EWB), psychological well-being (PWB), and social well-being (SWB) (Westerhof & Keyes, 2010). It first manifests as positive emotions and depends

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on the individual's perception of pleasure, satisfaction, and interest in life, which belongs to hedonic well-being. Positive mental health also requires having a sense of meaning and purpose in life, having positive social relationships, mastering competence, autonomy, and virtue, functioning effectively, and striving for excellence and a good life. It also manifests in terms of positive psychological and social functioning, which are components of eudaimonic well-being.

Well-being is often examined as an outcome indicator of older adults' life status after retirement, such as financial well-being, physical well-being, and psychological well-being (Wang, 2012). However, as a single life event, the impact of retirement on older adults' well-being is limited. Resource and psychological elements associated with retirement are more important for older adults' well-being (Wang et al., 2011). Therefore, individual psychological attributes, post-retirement social activities, and plan fulfillment are essential to retirement outcomes—positive mental health (i.e., emotional well-being, psychological well-being, and social well-being).

The process and result of retirement planning fulfillment are to attain well-being (Kerry, 2018). In his book Theory of Justice, Rawls (2009) suggests that personal life plans are developed based on individuals' talents, circumstances, and needs, which should be reasonable and conform to Aristotle's happiness principles. Moreover, the pathways to well-being are the successful fulfillment of personal life plans and the belief that one's reasonable life goal can be achieved.

In accordance with life planning, older adults enacted retirement planning based on their abilities, interests, circumstances, and sources. Personal retirement plans must also be reasonable and conform to Aristotle's happiness principles, with favorable purpose, motivation, and social significance that benefit social groups. We believe that retirement planning should be enacted for both happiness and self-actualization. Moreover, the outcome of retirement planning fulfillment combines hedonic well-being and eudemonia well-being (i.e., positive mental health). Fulfilling retirement plans is necessary for older adults' well-being and flourishing.

Self-esteem is also an outcome of retirement planning fulfillment. Rawls (2009) argues that fulfilling reasonable life plans helps build self-esteem. When people believe a plan is worthwhile, they would be motivated and take pleasure in fulfilling it. A person who is constantly working to achieve aspirations and self-worth through life plans is not only self-respecting but also confident. He or she will be more motivated to create some of the socially associative conditions that promote people's self-esteem and mutual respect.

Koestner et al. (2006) found that plan fulfillment and personal psychological characteristics, such as self-efficacy, work together to influence fulfillment outcomes. Does self-esteem, a personal psychological attribute, also related to positive mental health and plan fulfillment? Which has not been examined. We suppose self-esteem is an important psychological resource acquired over time during retirement planning fulfillment and further enhances positive mental health.

Social activities are bound to increase while older adults fulfill their retirement plans. As continuity theory suggests, humans generally tend to maintain consistent life patterns to avoid experiencing stressful disruptions caused by changes and transitions (Atchley, 1989). Social activities with continuity features (e.g., volunteering activities, physical activity, leisure, and cognitive training activities) help older adults maintain a continual self-concept and cope with physical and mental decline after retirement (Wang & Shi, 2014). Hence, retirement planning fulfillment is maintaining the continuity of life through practical actions. Older adults are thus more socially engaged, thereby improving their positive mental health.

Literature review

Few studies have examined the outcomes of retirement planning fulfillment. Principi et al. (2020) investigated the relationship between plan fulfillment and retirement satisfaction. They interviewed 112 older adults prior to and one and two years following retirement. The results suggested that older adults whose retirement plans had been fulfilled were more satisfied with their retirement. Psychological resources, resilience, and social engagement moderated the relationship between plan fulfillment and retirement satisfaction. This result provides an essential basis for our investigation.

Many studies have confirmed the positive relationship between retirement planning and well-being among older adults, such as hedonic well-being, psychological well-being and physical well-being (Newton, 2022; Chan et al., 2021). People who had a plan for their retirement leisure life reported higher retirement life satisfaction, vitality, and autonomy (Hetherington et al., 2021). Lack of long-term financial retirement planning was detrimental to retirees' mental and physical health (Niu et al., 2020). However, few studies focused on both hedonic well-being and eudemonia well-being together. There is also a lack of investigation into plan fulfillment and the association between retirement planning fulfillment and positive mental health.

Social activity participation is a modifiable factor that affects older adults' well-being (Burn et al., 2016; Chung et

al., 2021). Numerous studies have shown that social activity positively impacts older adults' psychological well-being and life satisfaction. A 12-year longitudinal study showed that older adults who tended to engage in multiple types of social activities (physical, social, and intellectual) had higher levels of mental health than those who only participated in a single type of social activity (Chao, 2016).

Recreational activities could improve older adults' self-esteem and reduce depressive symptoms (Michèle et al., 2019). Older adults who are socially active have a higher quality of life and lower psychological stress (Vozikaki et al., 2017; Costa & Neri, 2021). Existing studies have suggested that social activities show a positive effect on well-being. However, whether social activities are associated with positive mental health among older adults is unknown. The relationship between plan fulfillment and social activities has not yet been studied.

Self-esteem is an important psychological resource for retirement adjustment, associated with well-being and life satisfaction after retirement (Hansson et al., 2018). On average, older adults' self-esteem continues to decline in the five years before retirement and remains stable in the five years after retirement (Bleidorn & Schwaba, 2018). Self-esteem was related to emotional well-being; lower self-esteem predicted higher anxiety (Demeyer et al., 2018).

Research has found that retirement planning tailored to personal interests could promote self-esteem in older adults (Ng et al., 2019). For example, increased physical activity led to small but significant improvements in self-esteem among older adults (Olds et al., 2018); participation in art activities and lifelong learning can improve later-life self-esteem and life satisfaction (Yao et al., 2019; Szcześniak et al., 2020). It is known that both retirement planning and social activities are related to older adults' self-esteem. It can be speculated that retirement planning fulfillment is also associated with social activities and self-esteem and is related to older adults' positive mental health.

Many studies suggest continuing differences between rural and urban China regarding income, health, social activity, and well-being. Research has found that rural residents are only half as likely as urban residents to be financially prepared for retirement. Rural older adults are more likely to face financial difficulties after retirement than their urban counterparts (Chen et al., 2018). Inequalities between rural and urban areas in pensions, social security, and years of education further widen the differences in cognitive function and overall health of older adults (T. Zhang et al., 2022). Rural older adults have lower cognitive ability, nutritional awareness, and health than urban older adults (J. Zhang et al., 2022). In addition, the availability of recreational facilities is lower in rural compared to urban areas, and older adults have insufficient physical activity and lower well-being (Deng & Paul, 2018). We speculate that urban and rural older adults also differ in retirement planning fulfillment, which has yet to receive any attention in previous studies.

The present study

Retirement planning fulfillment is necessary for older adults to adapt to later life and maintain their quality of life. This study adds to the previous studies in the following ways. First, we examined the association between plan fulfillment and positive mental health among older adults for the first time. Previous studies have mainly investigated retirement planning but not plan fulfillment. We believe that plan enactment and plan fulfillment both play positive roles at different stages of the retirement process; plan fulfillment can perform a positive function and further enhance older adults' well-being.

Moreover, previous studies have only examined one of the well-being as an outcome of retirement planning, such as psychological, physical, and hedonic well-being. Our study examined positive mental health as an outcome of plan fulfillment, a unifying concept for combining hedonic and eudemonia well-being.

Second, our study investigates the underlying mechanism of plan fulfillment and positive mental health, with social activity and self-esteem as potential mediators. Existing research suggests that retirement planning positively affects well-being, but the underlying mechanisms investigated were inadequate. Based on Rawls' (2009) theory on life planning, well-being, self-esteem, and the continuity theory (Atchley, 1989), we speculate that social activity and self-esteem may mediate the retirement planning fulfillment—positive mental health link.

In addition, we also examined the difference between rural and urban older adults in plan fulfillment, which was very rare in previous studies. Based on the occupational characteristics of farming and breeding, older adults in rural areas usually continue to work to earn a living when they are sixty and above. They were less likely to fulfill a clear retirement plan. Moreover, many older adults in rural areas live alone and are more vulnerable than their urban counterparts regarding income, health, and social participation. Retirement planning for rural older adults needs the attention of researchers and policymakers.

Finally, we added residential planning as a dimension of retirement planning. Residential planning includes a section on older adults' actions regarding age-friendly home remodeling. Existing retirement planning questionnaires mainly focused on four sub-domains: financial planning, health planning, social planning, and psychological planning (Eismann et al., 2019). Although residential planning

had been suggested as a dimension of retirement planning in a few studies, they mostly asked older adults whom they wanted to live with or where they wanted to live in their later years. However, the conditions of living facilities were rarely mentioned.

Regardless of whom to live with and where to live, age-friendly remodeling in dwellings and communities is quite essential for older adults. To improve the living conditions of older adults in urban and rural communities, prevent accidents such as falls and acute illness attacks, and make their lives more comfortable and convenient. According to the policy document issued by the Ministry of Civil Affairs (2020), many cities in China are currently promoting age-friendly remodeling projects, including installing lifts, handrails, wheelchair ramps, and intelligent devices within dwellings and neighborhoods. Based on the social importance and research significance of age-friendly remodeling, we added residential planning as an indispensable dimension of retirement planning. Items inquire specifically about older adults' actions regarding age-friendly home remodeling.

Study hypothesis

Our study focuses on the association between retirement planning fulfillment and positive mental health and its internal mechanisms among older adults. In a face-to-face questionnaire survey, retirement planning fulfillment, positive mental health, social activities after retirement, and self-esteem of older adults were measured. Based on the above research objectives, combined with Rawls' theory of the relationship between life planning, well-being, and self-esteem, and the continuity theory, we propose two hypotheses: (1) Rural older adults have a lower level of retirement planning fulfillment than urban older adults. (2) Social activities and self-esteem mediate between the association of retirement planning fulfillment and positive mental health.

Methods

Participants

Samples were randomly selected in the community, residential institutions, and rural villages in Shanxi, Shaanxi, and Henan provinces. Participants were recruited through on-site advertising and advocacy by administrators of local urban resident committees, rural village committees and residential institutions. The recruitment criteria were older adults over 60 years old and had retired at the time of the survey. To collect the completed questionnaires, face-to-face interviews were conducted in participants' homes and public areas of neighborhoods, villages, and residential institutions to collect completed questionnaires, each lasting approximately 20 min.

A total of 1200 older adults participated in this study (M = 68.49, SD = 7.09), including 683 females (57%). 67.3% of participants had been retired for 5–10 years, and 392 participants had been retired for more than ten years (32.7%). 74.3% of the participants were married, and 6% had re-employment status. The average number of years of education for the total sample was 7.26 (SD = 3.93). According to China's administrative division level, the locations of this survey were classified as rural areas if they were in townships and villages, and urban areas if they were in counties and cities. In this survey, there were 537 older adults living in rural areas, accounting for 44.8% of the total sample.

All participants were informed of the purpose of the study. They signed a written informed consent form identifying their voluntary participation in the survey and allowing participants to withdraw at any time. Participants were paid twenty yuan (about US$2.80) for completing the questionnaires. The survey was approved by the Ethics Committee of Xi'an Jiaotong University.

Measures

Retirement planning fulfillment

We used the 17-item retirement planning fulfillment questionnaire. Items were drawn from two primary sources. First, we conducted a literature review and collected published retirement planning scales with good validity and reliability. Including the Retirement Planning Process Scale (the PRePS), the Retirement Planning Questionnaire (RPQ), and the Retirement Planning Questionnaire II (RPQII) (Noone et al., 2010; Petkoska & Earl, 2009; Muratore & Earl, 2010). Second, we interviewed eight older adults who had retired from various occupations. The interview questions were mainly about what they had done to prepare for retirement and what else older adults needed to plan based on their experience and knowledge.

From the literature review and interviews, ten items were selected. Seven items were added, such as "remodeling your home to suit the needs of older adults, for example, by installing handrails, anti-slip surfaces, wheelchair access, etc." and "purchasing or seeking older adult care services, such as hiring caregivers, going to a daycare center, or moving into a nursing home."

We used Exploratory Structural Equation Modeling (ESEM) to test the validity of the questionnaire (Asparouhov & Muthén, 2009). ESEM integrates the functions and advantages of Exploratory Factor Analysis (EFA) and

Table 1 Rotated factor loadings for the retirement planning fulfillment questionnaire

Questionnaire item	Origins	Planning domains				
		Financial planning	Health planning	Social life planning	Residential planning	Psychological planning
1. Planned expenses and savings.	RPQII (Denton et al., 2004)	**0.488**	0.453	0.013	0.218	0.395
2. Hold long-term investments or assets.	RPQ (Petkoska & Earl, 2009)	**0.802**	0.376	0.305	0.198	0.236
3. Hold life, injury, or health insurance.	RPQII (Denton et al., 2004)	**0.726**	0.398	0.294	0.201	0.198
4. Regular medical check-ups (at least once every two years).	RPQ (Petkoska & Earl, 2009)	0.321	**0.502**	0.163	0.226	0.300
5. Maintain healthy habits or quit bad habits (smoking, unhealthy diet, sedentary, etc.).	PRePS (Noone et al., 2010)	0.242	**0.586**	0.211	0.293	0.367
6. Learn about scientific health information, and improve health literacy.	RPQ (Petkoska & Earl, 2009)	0.267	**0.676**	0.048	0.413	0.528
7. Treat disease actively and follow medical advice.	PRePS (Noone et al., 2010)	0.126	**0.611**	0.177	0.338	0.327
8. Organizing daily routine.	PRePS (Noone et al., 2010)	0.387	0.270	**0.681**	0.444	0.548
9. Re-entering the workforce.	added	0.004	0.143	**0.352**	-0.091	0.144
10. Develop supportive social relationships.	RPQ (Petkoska & Earl, 2009)	0.287	0.098	**0.494**	0.444	0.425
11. Older adults-friendly home remodeling (non-slip flooring, handrails, etc.).	added	-0.047	0.298	0.010	**0.565**	0.263
12. Consider where to live or whom to live with.	added	0.335	0.427	0.574	**0.456**	0.369
13. Purchase home care services.	added	0.050	0.105	-0.029	**0.323**	0.101
14. Keep a happy and positive mood.	added	0.272	0.519	0.416	0.264	**0.635**
15. Consciously cognitive training.	added	0.083	0.486	0.172	0.414	**0.853**
16. Think about how to adapt to family and social roles after retirement.	PRePS (Noone et al., 2010)	0.236	0.513	0.129	0.553	**0.753**
17. Prepare mentally for death and loss.	added	0.047	0.241	0.032	0.265	**0.357**

Note: Items with loadings ≤ 0.30 retained on a factor are displayed in boldface font

Confirmatory Factor Analysis (CFA), which enables exploratory factor analysis to explore and verify the factor structure simultaneously. In addition to estimating the loadings of the item on its main factor, ESEM also estimates the factor cross-loadings to obtain closer to the actual results.

We conducted the ESEM with Mplus version 8 (Muthen & Muthen, 2017). The model was estimated with Maximum Likelihood (ML) and the Geomin rotation; five factors were extracted. The 17 items and their respective rotated factor loadings are shown in Table 1. Items with factor loadings equal to or higher than 0.3 in the corresponding dimension were retained and are shown in bold in the table. We compared the factor loading and model fit indices of the 3-factor, 4-factor, and 5-factor models. It is suggested that the 5-factor model fit well (Hu & Bentler, 1999; Marsh et al., 2004) and was most consistent with the theory (Table 2).

The final questionnaire contained 17 items, divided into five dimensions: financial planning (3 items), health planning (4 items), social life planning (3 items), residential planning (3 items), and psychological planning (4 items). Participants were asked to report on the extent to which their retirement planning was fulfilled according to their circumstances. The questionnaire was scored on a 4-point Likert scale with options: 0 (never planned), 1 (planned and neverfulfilled), 2 (planned and occasionally fulfilled), and 3 (planned and frequently fulfilled). A higher total score indicates a higher level of retirement planning fulfillment.

Positive mental health

To assess positive mental health, we used the Mental Health Continuum-Short Form (MHC-SF) (Lamers et al., 2011). The 14-item scale consists of three subscales: emotional well-being (EWB), psychological well-being (PWB), and social well-being (SWB). A six-point Likert scale is used, ranging from 0 (never) to 5 (every day), and the sum of all items is used to calculate the total score. The maximum score is 70. Higher scores indicate higher levels of positive mental health.

Table 2 Model fit indexes for 3-, 4-, and 5-factor models comparison for the retirement planning fulfillment questionnaire

Models	χ^2	df	χ^2/df	RMSEA	CFI	TLI	SRMR
Three-factor model	355.75	88	4.04	0.05	0.94	0.91	0.03
Four-factor model	192.84	74	2.61	0.04	0.97	0.95	0.02
Five-factor model	135.68	61	2.22	0.03	0.98	0.96	0.02

Table 3 Characterization of the total sample and comparison by resident subgroups for sociodemographic and main variables

Variable	Total (n = 1200)	Rural (n = 537, 44.8%)	Urban (n = 663, 55.3%)	t/χ^2	p
Age (years), *M (SD)*	68.49 (7.09)	68.81(7.12)	68.23(7.06)	1.40	0.160
Gender, *n (%)*					
Male	517 (43%)	203 (17%)	314 (26%)	11.05 a	0.001
Female	683 (57%)	334 (28%)	349 (29%)		
Years of education, *M (SD)*	7.26 (3.94)	5.243(3.48)	8.891(3.50)	-17.97	<0.001
Marital state, *n (%)*					
Married	892 (74.3%)	354 (29.5%)	538 (44.8%)	48.79 a	<0.001
Single or divorced	89 (7.4%)	67 (5.6%)	22 (1.9%)		
Widowed	219 (18.3%)	116 (9.7%)	103 (8.6%)		
Retirement years, *n (%)*					
5 ~ 10 years	808 (67.3%)	346 (28.8%)	462 (38.5%)	3.72 a	0.054
over10 years	392 (32.7%)	191 (15.9%)	201 (16.8%)		
Retirement planning, *M (SD)*	1.44 (0.68)	1.23 (0.67)	1.62 (0.63)	-10.31	<0.001
Financial planning	1.16 (1.00)	0.86 (0.92)	1.40 (0.99)	-9.85	<0.001
Health planning	1.92 (0.92)	1.69 (0.94)	2.10 (0.86)	-7.84	<0.001
Social life planning	1.33 (0.86)	1.12 (0.88)	1.50 (0.80)	-7.83	<0.001
Residential planning	0.91 (0.80)	0.61 (0.56)	0.73 (0.62)	-3.41	0.001
Psychological planning	1.67 (0.94)	1.43 (0.92)	1.86 (0.91)	-8.11	<0.001
Social activity, *M (SD)*	2.53 (0.64)	2.32 (0.65)	2.71 (0.58)	-10.98	<0.001
Self-esteem, *M (SD)*	3.53 (0.62)	3.36 (0.63)	3.67 (0.58)	-8.98	<0.001
Positive mental health, *M (SD)*	3.33 (0.88)	3.13 (0.90)	3.49 (0.83)	-7.17	<0.001
Emotional well-being	3.62 (1.13)	3.49 (1.21)	3.72 (1.04)	-3.55	0.001
Subjective well-being	3.25 (0.94)	3.02 (0.89)	3.43 (0.94)	-7.69	<0.001
Psychological well-being	3.25 (1.10)	3.03 (1.16)	3.42 (1.02)	-6.05	<0.001

Note. a Chi-squire test; others are t-tests

Self-esteem

To assess self-esteem, we used the 10-item Rosenberg Self-Esteem Scale (Rosenberg, 2011). The items on the scale are answered on a 5-point Likert-type scale, from 1 (strongly agree) to 5 (strongly disagree). Higher scores indicate a greater level of self-esteem, with the nominal range falling between 10 and 50.

Social activity

Social activities were measured using a range of activities: watching art performances, going on trips, reading, enjoying art shows, practicing calligraphy, painting, writing, gardening, volunteering, attending a senior citizen's college, playing sports, gardening, farming, taking care of family members, taking care of grandchildren, visiting relatives and friends, etc. (Michèle et al., 2019). They were classified into seven categories: aesthetic activities, cognitive training activities, recreational activities, physical activities, livelihood activities, social interaction activities, and mental health promotion activities.

Respondents were asked to report how often they had engaged in various social activities in the last three months. The frequency of each activity was based on a 5-point scale: 1 (never), 2 (twice a month), 3 (once a week), 4 (2–3 times a week), and 5 (every day). The total score is the sum of the frequency of older adults' social activities. A higher total score indicates a higher level of participation.

Socio-demographic variable

Personal and socio-demographic variables include age (years), years of education (years), gender (male or female), residence (urban or rural), and marital status (married, single, divorced, or widowed).

Analytic strategy

SPSS 24.0 was used for preliminary data analysis. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to describe the study sample and the main variables. An independent sample t-test and Chi-square test were used to compare the mean differences between urban and rural subsamples. Partial correlation was used to test the correlation between the main variables after controlling for gender, age, years of education, and residence. Amos 24.0 was used to test the hypothesized mediating model of retirement planning fulfillment and positive mental health after controlling for gender and years of education. A bias-corrected percentile bootstrap method was used to examine the mediating effects. Bootstrap 95% confidence

Table 4 The Cronbach's alpha and partial correlations between the main variables

Variables	Cronbach's alpha	1	2	3	4	5	6	7	8	9	10	11	12
1. Financial planning	0.60	1											
2. Health planning	0.70	0.41***	1										
3. Social life planning	0.62	0.37***	0.50***	1									
4. Residential planning	0.61	0.30***	0.35***	0.40***	1								
5. Psychological planning	0.71	0.31***	0.48***	0.49***	0.44***	1							
6. Retirement planning	0.84	0.65***	0.79***	0.74***	0.65***	0.78***	1						
7. Social activity	0.90	0.23***	0.36***	0.41***	0.30***	0.34***	0.45***	1					
8. Self-esteem	0.77	0.12***	0.23***	0.26***	0.16***	0.29***	0.30***	0.26***	1				
9. Emotional well-being	0.81	0.03	0.16***	0.08***	0.10***	0.11***	0.14***	0.21***	0.27***	1			
10. Social well-being	0.65	0.15***	0.23***	0.18***	0.13***	0.16***	0.24***	0.273***	0.32***	0.45***	1		
11. Psychological well-being	0.84	0.09***	0.23***	0.17***	0.17***	0.20***	0.24***	0.360***	0.34***	0.51***	0.58***	1	
12. Positive mental health	0.86	0.12***	0.26***	0.18***	0.17***	0.20***	0.26***	0.355***	0.38***	0.73***	0.82***	0.90***	1

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$ (two-tailed)

intervals (95% CI) for mediating effects were calculated by repeated random sampling of 5000 Bootstrap samples from the original data. None of the 95% confidence intervals for the mediated paths included 0, indicating they were all statistically significant (Mallinckrodt et al., 2006). Model fit indices were a Chi-square value divided by a degree of freedom (χ^2/df) less than 5, a comparative fit index (CFI) and a Tucker-Lewis Index (TLI) greater than 0.90, a root mean square error of approximation (RMSEA) value and standardized root mean square residual value (SRMR) less than 0.05 indicated excellent fit to the data (Hu & Bentler, 1999; Marsh et al., 2004).

Results

Primary Analysis

Table 3 shows the results of urban-rural differences in retirement planning fulfillment. Regarding overall plan fulfillment, rural older adults had a significantly lower level of fulfillment than urban older adults (t = -10.31, $p<0.001$). In all dimensions of retirement planning: financial planning, health planning, social planning, residential planning, and psychological planning, rural older adults significantly scored lower than urban older adults (all $ps<0.001$).

Table 4 shows the results of partial correlations between the main variables. The results indicate that retirement planning fulfillment is positively associated with positive mental health ($r=0.26$, $p<0.001$) and all three dimensions of positive mental health: emotional well-being ($r=0.14$, $p<0.001$), social well-being ($r=0.24$, $p<0.001$), and psychological well-being ($r=0.24$, $p<0.001$). Plan fulfillment was also positively correlated with social activities ($r=0.45$, $p<0.001$) and self-esteem ($r=0.30$, $p<0.001$). This means that higher levels of retirement planning fulfillment are associated with higher social activity frequency, higher levels of self-esteem, and positive mental health among older adults.

The mediating role of social activity and self-esteem

To test hypothesis 2, we built a mediation model that included all paths of retirement planning fulfillment, social activities, self-esteem, and positive mental health after controlling for gender and years of education. The goodness-of-fit indicators were $\chi^2/df=1.89$, TLI = 0.99, CFI = 1.00, RMSEA = 0.03, SRMR = 0.01. The results indicated that the paths from plan fulfillment to social activity, self-esteem, and positive mental health were all statistically significant

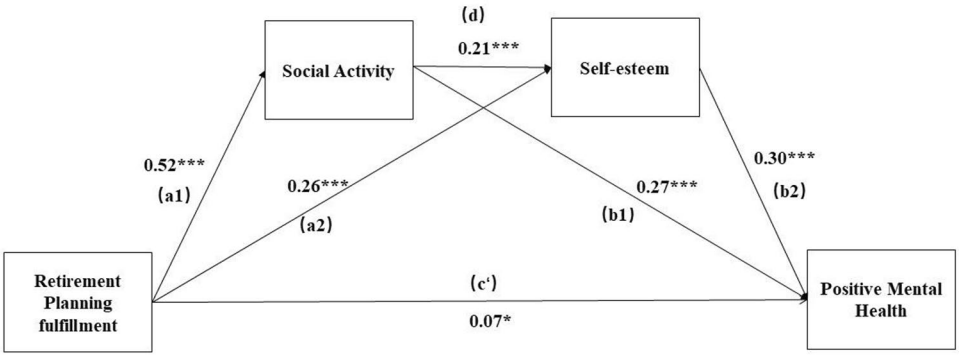

Fig. 1 The total sample model of social activity and self-esteem as mediators (n=1200). Numbers in the figure indicate standardized regression coefficients (β). Model fit indices: χ^2/df=1.89, TLI=0.99, CFI=1.00, RMSEA=0.03, SRMR=0.01. $^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$

Table 5 Path analysis of the total sample mediation model and subgroups mediation models

Label	Paths	Total sample model		Retirement 5–10 years		Retirement above 10 years		Rural		City	
		β	*p*	*β*	*p*	*β*	*p*	*β*	*p*	*β*	*p*
a1	RPF → social activity	0.52	<0.001	0.52	<0.001	0.50	<0.001	0.53	<0.001	0.43	<0.001
b1	Social activity → PMH	0.27	<0.001	0.28	<0.001	0.26	<0.001	0.24	<0.001	0.29	<0.001
a2	RPF → self-esteem	0.26	<0.001	0.27	<0.001	0.22	<0.001	0.24	<0.001	0.22	<0.001
b2	Self-esteem → PMH	0.30	<0.001	0.30	<0.001	0.30	<0.001	0.32	<0.001	0.27	<0.001
d	Social activity → self-esteem	0.21	<0.001	0.21	<0.001	0.23	<0.001	0.20	<0.001	0.16	<0.001
c’	RPF → PMH	0.07	0.025	0.06	0.108	0.08	0.116	0.09	0.061	0.05	0.233
c	RPF → PMH	0.29	<0.001	0.29	<0.001	0.28	<0.001	0.30	<0.001	0.23	<0.001

Note: RPF: Retirement planning fulfillment, PMH: positive mental health

(Fig. 1). Plan fulfillment was positively associated with positive mental health c ($\beta=0.29$, $p<0.001$). In the mediation model, the path from plan fulfillment to positive mental health was significant c’ ($\beta=0.07$, $p=0.025$) (Table 5).

The mediation model test results showed that both social activity and self-esteem had a significant mediation effect between retirement planning fulfillment and positive mental health (effect size:0.51, 95% CI [0.40, 0.61]; effect size: 0.08, 95% CI [0.06, 0.11]), respectively. Social activity and self-esteem jointly had a significant mediated effect on retirement planning fulfillment and positive mental health (effect size: 0.04, 95% CI [0.02, 0.05]) (Table 6).

A multi-group analysis was conducted to examine whether retirement years subgroups and urban-rural subgroups fit into the same mediation model. Based on the existing model, we rebuilt a constrained and unconstrained model. The constrained model restricts the path coefficients to be equal across subgroups, and the unconstrained model allows the path coefficients to be freely estimated across subgroups. The chi-square difference test (Bollen, 2014) was used to determine whether there was a significant difference between the constrained and unconstrained models.

The mediation models were developed separately according to the retirement years: 5–10 years and above 10 years. The unrestricted model ($\chi^2/df=2.35$, CFI=0.993, TLI=0.965, RMSEA=0.034, SRMR=0.024) and the restricted model ($\chi^2/df=1.29$, CFI=0.997, TLI=0.993, RMSEA=0.016, SRMR=0.025) both showed a good fit to data. There was no significant difference ($\Delta\chi^2=1.38$, $\Delta df=6$, $p=0.976$) between the 5–10 years subgroup and the above 10 years group in the mediating model. In addition, there was no significant difference between urban and rural subgroups ($\Delta\chi^2=9.44$, $\Delta df=6$, $p=0.150$) in the mediation model (Table 7).

Discussion

This study focused on the underlying mechanism between retirement planning fulfillment and positive mental health. The results generally support the hypotheses proposed in the study. Compared to urban older adults, rural older adults reported a significantly lower level of retirement planning fulfillment. Social activities and self-esteem mediate between the association of retirement planning fulfillment and positive mental health.

The first result shows that rural older adults reported a significantly lower retirement planning fulfillment than their urban counterparts. It suggests that, compared with urban older adults, rural older adults are more vulnerable in their retirement planning. The occupational characteristics of farming and breeding determine that older adults in rural areas generally lack the consciousness of retirement planning, let alone a clear retirement plan. Statistics show that

Table 6 The mediation effects of the total sample mediation model and subgroups mediation models

Label	Paths	Total sample model		Retirement 5–10 years		Retirement above 10years		Rural		City	
		Effect size	95%CI	Effect size	95%CI	Effect size	95%CI	Effect size	95%CI	Effect size	95%CI
a1*b1	RPF → social activity → PMH	0.51	[0.40, 0.61]	0.49	[0.37, 0.65]	0.14	[0.08, 0.19]	0.57	[0.41, 0.74]	0.13	[0.09, 0.18]
a2*b2	RPF → self-esteem → PMH	0.08	[0.06, 0.11]	0.09	[0.06, 0.13]	0.07	[0.04, 0.13]	0.09	[0.05, 0.14]	0.06	[0.04, 0.10]
a1*d*b2	RPF → social activity → self-esteem → PMH	0.04	[0.02, 0.05]	0.03	[0.02, 0.06]	0.04	[0.02, 0.06]	0.04	[0.02, 0.06]	0.02	[0.01, 0.04]

Note: RPF: Retirement planning fulfillment, PMH: positive mental health

the poverty rate of the older adult population in urban areas and rural areas was 0.44% and 6.55% in 2016, respectively. In 2017, 39.49% of older adults above 60 in rural areas of China lived alone (He et al., 2020). In other words, poverty, being left behind, and deprivation are more severe in rural areas than in urban areas. Older adults in rural areas are more impoverished in consumption, health, and confidence than those in urban areas (Gong et al., 2022).

The results also showed that older adults scored higher on health and psychological planning fulfillment. One-third of older adults have never fulfilled their financial and residential plans. A possible reason for the low level of financial and residential plan fulfillment is the lack of awareness of financial and residential planning in the first place, or the inability to fulfill it due to constraints for various reasons.

During the survey interviews, many older adults reported they had simple ideas about their later life but often fail to fulfill them due to health, facilities, or financial conditions. Older adults are generally more conscious of their health and tend to participate in activities such as exercise and health-nurturing practices. However, higher levels of financial planning require more financial literacy. Regarding financial planning, older adults prioritize saving and spending rather than investing. There is a general lack of awareness of residential planning, especially for age-friendly redecorating. Residential planning requires extra spending on redecoration and equipment, and many older adults tend to save on this expenditure. Improving the financial and residential planning of older adults from the policy is a problem that needs another solution.

Our results support the hypothesis that social activity and self-esteem mediate the association between retirement planning fulfillment and positive mental health. Moreover, the mediation model has stability across retirement years and urban-rural among older adults. In other words, older adults with a higher level of retirement planning fulfillment engage in more social activities and have higher levels of self-esteem, promoting positive mental health jointly. Older adults can benefit from the pathway regardless of how long they have been retired or whether they live in a rural or urban area. The findings support Rawls' theory that the successful fulfillment of a reasonable life plan is a prerequisite for achieving well-being; and that a reasonable life plan establishes self-esteem. Possible explanations for these findings are discussed below.

Retirement planning fulfillment is an adaptive process to later life and predicts well-being. Older adults with retirement planning are more likely to report positive attitudes, contributing to better adjustment, as reflected in higher mental and physical health (Chan et al., 2021; Yeung, 2013). Retirement planning can help older adults continue their previous life patterns and consistently build a sense of life purpose and hope, promoting well-being in later life (Wang et al., 2011). The process of fulfilling retirement plans may imply that older adults are gradually completing their role transformation and identification with themselves. Retirement planning can, directly and indirectly, increase older adults' confidence in coping with old age (Ghafoori et al., 2021), and those confident about the changes that come with retirement report higher well-being (Liu et al., 2021).

Retirement planning fulfillment is also a process of accessing resources necessary for maintaining one's self-esteem. Changes in quality of life in later life depend on how much individuals have access to resources in important life domains, including health, financial, social, cognitive, and emotional resources (Amorim & Hernandez, 2020). These

Table 7 Model fit indices of the total sample mediation model and subgroups mediation models

Models		χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR	Model comparison
Total sample model		3.79	2	1.89	1.00	0.99	0.03	0.01	-
Retirement years model	unconstrained model	14.09	6	2.35	0.99	0.97	0.03	0.02	$\Delta\chi^2 = 1.38, \Delta df = 6, p = 0.976$
	constrained model	15.47	12	1.29	1.00	0.99	0.02	0.03	
Residents model	unconstrained model	13.13	6	2.19	0.99	0.96	0.03	0.03	$\Delta\chi^2 = 9.44, \Delta df = 6, p = 0.150$
	constrained model	22.57	12	1.88	0.99	0.97	0.03	0.04	

resources are obtained during the fulfillment of retirement planning. Specifically, financial and physical resources are acquired through financial and health plans to maintain a stable quality of life. Social resources are acquired through social life planning to continue actively involved in social engagement and meaningful life. Maintain positive emotions and readiness through psychological planning to obtain cognitive and emotional resources to cope with future losses and life changes.

In fulfilling retirement planning, older adults can also increase their retirement resources according to their needs, thus contributing to better physical and mental health in the long term (Yeung & Zhou, 2017). Older adults without retirement savings were 3.6 times more likely to have severe anxiety or depression than those with financial security (Chen et al., 2018). It also means that older adults can maximize their well-being in later life by fulfilling retirement plans.

Realizing retirement plans is also a process of satisfying the needs of older adults. These include survival, relationship, and self-determination needs (Blustein, 2008). Fulfilling retirement plans enables both explicit functions (e.g., providing financial income to sustain their lifestyle) and implicit functions (e.g., providing opportunities for social activities and interaction, developing self-esteem, etc.) to be displayed. An approach to improving well-being is to support personally appropriated goal-setting and goal-striving activities (Slade, 2010). That is, supporting both retirement planning enactment and fulfillment. Retirement planning and fulfillment urge older adults to re-engage with their lives.

From a theoretical perspective, this study adds to our understanding of the mechanisms underlying the relationship between retirement planning fulfillment and positive mental health. Retirement planning fulfillment promotes older adults' positive mental health by increasing their social activity and self-esteem. This finding emphasizes the importance of assisting older adults in developing and fulfilling retirement plans, thereby improving their positive mental health. It also provides preliminary confirmation of Rawls' theory on life planning, well-being, and self-esteem. In addition, this study adds to the existing framework for measuring retirement planning. We suggest residence planning as a retirement planning sub-dimension, which includes age-friendly home remodeling. Residence planning must be included in the retirement planning fulfillment checklist for older adults.

From a practical level, this study highlights the importance of retirement planning fulfillment for older adults. Currently, the number and proportion of older adults in countries worldwide are on the rise. Population aging poses a substantial social challenge to many countries. Retirement planning requires the participation of many parties, with governments and businesses playing an integral role. Governments must provide guidance, support, and services to older adults, raise awareness about life planning in old age, and encourage retirees to enact reasonable retirement plans. It also needs to establish a protection system to assist older adults in fulfilling their retirement plans and enhance their ability to cope with their later years.

The study has some limitations. First, a cross-sectional research design was used to collect information. This resulted in unable to comprehensively understand older adults' temporal changes in retirement planning fulfillment, social activity, self-esteem, and positive mental health before and after retirement. Future studies may use a longitudinal design to establish more accurate causal relationships between variables. Second, the differences in retirement planning fulfillment between rural and older adults need further investigation and discussion to explore the underlying mechanisms and causes and provide a policy basis for reducing urban-rural disparity.

Conclusion

This study focuses on the mechanisms underlying the relationship between retirement planning fulfillment and positive mental health among older adults. Our findings indicate that retirement planning fulfillment is positively associated with social activity, self-esteem, and positive mental health. Social activity and self-esteem mediated the relationship between retirement planning and positive mental health. Retirement planning fulfillment among rural older adults is lower than that of urban older adults. The results indicated that improving retirement planning fulfillment for older adults contributes to their hedonic and eudaimonic well-being. Fulfilling retirement plans is one of the inherent requirements for achieving active aging.

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Data availability Datasets can be provided by corresponding authors upon request.

Declarations

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