



Overage labor, value perceptions, and happiness in urban older adults' lives: Empirical evidence from China

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ABSTRACT

Background: Over the past four decades, China has seen a rapid increase in the level of urbanization, along with an increasing number of older adults. How to promote active aging in the midst of rapid urbanization has become a new challenge for the Chinese government and all sectors of society. This study attempts to verify the relationship between overage labor and happiness in life, and further explore the possible mediating role of multidimensional value perceptions.

Method: Based on 5010 valid samples from the 2011, 2013, 2015, and 2018 China Health and Aging Tracking Survey datasets (CHARLS), the study explored and tested the differences in happiness in life between older adults with overage labor and retired older adults. In addition, this study further examined the mediating role of multidimensional value perceptions using a mediation model.

Results: (1) Urban older adults with overage labor had significantly higher levels of happiness in life compared to urban retired older adults. (2) The higher level of life happiness of urban older adults with overage labor depends on their perceptions of different values; (3) Specifically, the realization of value perceptions in personal, family and social dimensions through labor contributes to the life happiness of urban older adults with overage labor.

Conclusion: There is a significant difference between urban old adults with overage labor and urban retired old adults in terms of happiness in life. At the same time, the study confirmed that all three aspects of value perceptions, such as personal, family and social, are the mediating mechanisms between overage labor and urban old adults in terms of happiness in life.

1. Introduction

Happiness is an interdisciplinary research topic, with initial studies in the field of psychology [1]. Life happiness is a concept that focuses on the linkage between life satisfaction and subjective happiness [2]. It embodies an individual's holistic evaluation of their

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quality of life [3]. Life satisfaction is a self-evaluation of one's long-term mental and physical condition and actual reality, equilibrated using self-determined criteria [4]. In contrast, subjective happiness reflects one's emotional experience of positive and negative feelings. Essentially, individuals are content when their positive emotions outweigh the negative ones [5]. Today, as the world is actively coping with aging, an important aspect of enhancing national happiness is to improve the life happiness of older adults. Life happiness is an important indicator of mental health and quality of life of older adults [6]. Bowling ascertained that mentally healthy older adults lead more active lives, and that life happiness is moderately associated with active aging [7] (see Fig. 2).

Labor status has long been acknowledged as a vital factor influencing the happiness of occupational groups in their lives [8,9]. However, there is an inherent perception that older adults have largely withdrawn from the labor market. This perception is particularly evident in urban China. As a consequence, the relevance and potential impact of labor on the life happiness of older adults are frequently disregarded. However, it is very common for older adults to keep working actually. A study on the labor capacity of retired women in China reveals that the excess labor capacity of urban women aged 50 to 64 is 6.1–7.8 years, while that of urban women aged 50 to 74 is 9.8–14.9 years. Moreover, the excess working capacity of urban women is approximately 6 times that of rural women, and the excess working capacity of highly educated women is 3 times that of illiterate women [10], and Ulrich refers to this group of people who continue to work after reaching retirement age as “Silver workers” [11]. This kind of work is known as “bridge employment”, which serves as a link or transition between regular employment and total withdrawal from the labor market [12–14]. From an international perspective, the employment rate of the older adults aged 65 and above in the Organisation for Economic Co-operation and Development (OECD) countries has remained above 14% for decades, exhibiting a steady increase [15]. In China, the number of older adults in the retirement age group who continue to work is increasing year by year, and the concept of “retirement without retirement” has arisen [16]. In fact, the seventh census of China shows that by the end of 2020, the proportion of employed persons aged 60 and above will be 8.8%, and the proportion of those aged 65 and above will be 5%. So it is estimated that the number of employed older adults in China will be more than 66 million in 2020, accounting for about a quarter of the total older adult population. And within this group, there are significant urban-rural differences. In comparison with their rural counterparts, older workers in urban areas are more willing to be employed. The third tracking survey on the status of China's urban and rural older adult population shows that the percentage of employment intentions for China's urban older adults is 13.2%, with the employment intentions of 63-year-old urban older adults even reaching 47.6%. This leads us to conclude that it is imperative to delve deeper into the relationship between labor and the overall life happiness of urban older adults.

Since the reform and opening up, China has experienced rapid urbanization and aging. In this process, the size of the urban older adults continues to expand, accounting for an increasingly high proportion of the population. By 2020, 149 prefectural-level cities in China had a population aged 65 and above accounting for more than 14% of the total population, which means they have entered a stage of deep aging.¹ At the same time, the issue on the life happiness of urban older adults in China has also come into the limelight. Surveys have shown that although the life happiness of Chinese urban older adults is increasing year by year, nearly 35% of them still consider their life happiness to be average or unhappy [17]. How to further improve the life happiness of Chinese urban older adults has become an important topic of discussion between the government and the society. Among them, it is worth noting that only 21% of the urban older adults who continue to participate in labor perceive their life happiness as low, which is significantly lower than that of the older adults who do not continue to participate in labor [18]. So, does continuing to work have a measurable impact on the happiness of urban older adults? If so, to what extent? And if it does, what are the impact pathways? This constitutes the theoretical attempt of this study. This study aims to shed light on the positive impact that continuing to work can have on the overall happiness of older adults residing in urban areas, thereby offering empirical evidence to support efforts aimed at improving the life satisfaction of this population and building a positive aging society.

2. Literature review

In the academic community, the impact of overage labor on the life happiness of older adults has sparked a controversy. Many scholars have used the term “continued work” to describe this phenomenon.

According to the “psychosocial-materialist approach,” work plays a crucial role in the identity formation of older adults, providing them with economic, social, and psychological resources [19]. Consequently, the impact of continued work is believed to be positive. Continued work has been found to enhance the economic income status of older adults [20] and instill a sense of job security among retirees [21]. Additionally, it offers opportunities for active engagement and social interactions [22], improving interpersonal relationships and social standing [23,24], as well as benefiting mental health [25]. These factors collectively contribute to the overall health status, life satisfaction and happiness of older adults.

On the contrary, the “psychosocial-environmental approach” highlights work-related stress and occupational risks, attributing negative effects to continued work. A substantial body of empirical research demonstrates the adverse psychological effects and behaviors associated that are commonly with retirement [26,27]. Continued work is associated with longer work hours, physically harder work [28], and higher work stress [29]. Moreover, it can reduce leisure time and limit opportunities for exercise, thereby impacting the health status of older adults [30] and diminishing their life satisfaction [31]. Even some studies exploring the timing of retirement have shown that early retirement has positive effects on the physical and mental health of older adults, while the opposite has negative effects [29].

¹ Data source: China Statistical Yearbook 2021, <https://www.stats.gov.cn>.

Furthermore, studies have argued that the continuation of work beyond the traditional retirement age is not significantly associated with the psychological happiness and life satisfaction of older adults [32–34]. They believe that the psychological happiness of older adults in retirement is largely thought to be determined by genes and personality [31,32] and may also be related to older adults' personal experiences and how well they match the cultural institutional environment at the time of retirement [35].

Additionally, we can see that there are different mechanisms that shape the life happiness of overage labor, which may be caused by the structural differences that exist within overage labor. In China, urban-rural disparities play a crucial role in determining the life situations of older adults. In rural China, due to the inadequacy of the old-age security system, older adults have to continue to work for economic income [15]. The economic situation is also directly related to the quality and level of their life in their later years, which affects their life happiness [36]. In other words, the main reason for rural older adults to engage in labor is to increase their income. Income is also an important path to enhance their life happiness. This has been generally confirmed by the academic community [21, 28]. However, in comparison, the material conditions of older adults are generally better in urban China. The pension coverage is large and has maintained a trend of continuous improvement, with average pension income replacement rates even approaching 100%, and the level of pension security can meet the basic needs of urban older adults [15]. In light of the above, the motivation of Chinese urban older adults to choose to continue to work may be different from that of rural older adults.

According to Maslow's hierarchy of needs theory, human needs can be categorized from lower to higher levels, including physiological needs, safety needs, love and belongingness, esteem, and self-actualization. Maslow also points out that it is difficult for people to accomplish self-actualization before middle age due to the diversion of energy. However, in old age, the desire for self-actualization is more likely to be stimulated. Given that physiological needs and security needs can be basically satisfied, urban older adults will pursue self-maturity and self-transcendence needs and more strongly hope to participate in social and economic activities through career development, so as to gain social respect, realize self-worth and reap the happiness and success of career development in life [37]. In developed countries with high urbanization rates, most older adults live in cities, and they are more likely to maintain strong ties with colleagues, clients, and even society by continued work, where they can have the opportunity to continue to realize their self-worth and thus improve their quality of life and happiness [38]. Moreover, as older adults age, their intrinsic motivation to continue working increases significantly, while the extrinsic financial motivation decreases significantly [37]. Therefore, compared with the urban older adults who do not continue to work, the urban older adults who work over the age possess a more positive attitude towards life, and are more inclined to obtain a sense of value through the realization of personal goals, thus forming a higher happiness of life.

However, the above conclusions are mainly based on empirical evidence from developed countries. Furthermore, the current research lacks an analysis of the path of family and social value perception, and neglects a comprehensive understanding of Chinese family ethics and socio-cultural orientation. Whether they are applicable to China is not yet supported by research. Moreover, influenced by traditional concepts and social opinion, Chinese older adults have their own unique understanding of value realization. In addition to the perceived value of the personal dimension, they usually also consider providing support to their families and contributing to society as part of value realization: On the one hand, in China, the urban older adults who continue to participate in labor usually incorporate the financial needs of their families into their economic behavior goals. The extra income from overage labor helps the urban older adults to support the family economy, boost their sense of family value, and thus improve their happiness of life. On the other hand, compared with the urban older adults who do not continue to work, the urban older adults who remain in overage working state have higher social status and social activity. Positive evaluation from social circles and the realization of social donations are conducive to the improvement of their life happiness.

Therefore, building on the verification of the influence of overage work on life happiness of the urban older adults, this study analyzes whether value perception is the intermediary mechanism between overage work and life happiness of the urban older adults, and examines the mediating role of value perception from different dimensions. The research conclusion will reveal the pathway of the role of the value perception of overage work on life happiness of the urban older adults, and demonstrate the important role of family and social value perception besides personal value perception on the relationship between overage work and life happiness of the urban older adults people in China, providing new cognitive ideas for understanding the value of overage work, and the connotation of self-realization value in Maslow's hierarchy of needs theory [39].

3. Materials and methods

3.1. Data

The data used in this study came from the China Health and Retirement Longitudinal Study (CHARLS), which was jointly implemented and completed by the Research Center for Healthy Aging and Development of Peking University and the Chinese Center for Disease Control and Prevention. The CHARLS dataset is widely applied in the research of pension, health, labor and other relevant issues. The data has the characteristics of large sample, longitudinal dimension and board coverage, covering the information of respondents' family structure, employment and retirement status, health status and other aspects, including a variety of labor market participation indicators and rich indicators of personal health status. It is representative of the entire country and can fully reflect the

individual health and labor participation status of urban older adults in China. For specific data choosing, the study used the Harmonized CHARLS dataset compiled by Peking University and selected the most recent surveys completed in 2011, 2013, 2015, and 2018² to form a mixed cross-section to reflect the individual health and labor participation of urban older adults in China. Taking into account the applicability of the research topic and according to the Provisional Measures on the Retirement and Retirement of Workers (Guo Fa [1978] No. 104) issued by the State Council of China, the objects are strictly limited to women over 55 years old and men over 60 years old³ with non-agricultural household registration living in cities. The total effective sample size of this study was 5010 after excluding or supplementing missing or rejected samples of key variables. The empirical analysis of this study is completed based on stata16.

3.2. Measures

3.2.1. Dependent variables

The dependent variable of this study is happiness of the individual. Due to the evaluation of life happiness measured by the five-point method was difficult to further reflect the small changes of personal happiness. This study examined the life happiness of older adults from the perspective of emotional experience, and this study measured individual happiness through the positive emotional dimension of emotional experience to enhance the reliability of the results. Specifically, the positive emotion evaluation index of urban older adults was constructed from the frequency of “I am full of hope for the future” and “I feel very happy” in the CHARLS data set, and the frequency from low to high was assigned 1–4 points respectively. Then, the scores of the two feelings were added up, and the score range was 2–8 points. The higher the score, the higher the positive emotion, and the stronger the life happiness of the individual.

3.2.2. Independent variables

The independent variable of this study is overage labor. In this study, 60 years old for men and 55 years old for women were determined as the standard of retirement age to measure and distinguish urban older adults in this study. Those who reach this age standard were urban older adults, otherwise they were not. At the same time, existing studies have various definitions of whether the older adults participate in labor, such as the number of working days or working hours of older adults in the past year. However, considering the particularity of the urban older adults, this study limited the participation of urban older adults in non-agricultural labor activities with financial incomes. Specifically, rural older adults practice a single lifelong family agricultural labor, while the employment of urban older adults includes retirement re-employment and overage employment, engaged in non-agricultural industries, including labor practices such as delayed retirement age, freelance work, and self-employment as an employer or hired worker. Based on this criterion, participation in non-agricultural hired labor with salary and bonus, participation in non-agricultural self-employment in the narrow sense, and participation in family self-employment were defined as overage labor and assigned a value of 1. Otherwise, they were considered to be out of labor retirement status and assigned a value of 0.

3.2.3. Control variables

Focusing on the life happiness of older adults, referring to existing studies [40], at the same time, considering the significant influence of public pension policies such as pension and resident pension insurance or commercial pension insurance on the labor supply of older adults [41], as well as the influencing factors that have a strong endogenous relationship with the choice of the older adults participating in over labor, this study selected the following control variables: Age, gender, marriage, education, health, social activity, cognition, pension, indebt, family size. The variables are defined in Table 1.

3.2.4. Mediating variables

According to the above analysis, this study considered that perception of value may be the way that the labor participation of urban older adults affects their happiness in life, which is mainly reflected in the three dimensions of individual, family and society. Based on the possible influence paths and the availability of data, this study chose whether older adults in urban areas purchased private medical insurance (private_health_insurance) to measure their perception of personal value. Those who purchased private medical insurance were assigned a value of 1; otherwise, they were assigned a value of 0. Perceptions of family value were measured by whether financial support was provided to their children or parents in the previous year (economic_support_to_others), with a value of 1 for offering financial help and support, or 0 for not providing any financial support. The donations in kind or cash provided to the society (Indonation) in the previous year were selected as the proxy variable for the social value perception of the urban older adults, and logarithmic was taken.

In addition, the relationship figure is constructed according to these major variables in this study.

² After CHARLS was conducted in 2011, the national tracking surveys were conducted again in 2013, 2015 and 2018. Data from all these years were included in this study. In addition, due to the impact of the COVID-19, CHARLS has been temporarily suspended since 2018, so the 2018 data is the latest data.

³ Resolution of the Standing Committee of the National People's Congress on the Approval of the Provisional Measures of the State Council on the Retirement and Retirement of Workers, BYU Law Database, <https://www.pkulaw.com/law?isFromV5=1>.

Table 1
Variable definition.

	Variable	Variable meaning
Dependent variable	happiness	The total score of the urban older adults' perception of life hope and happiness
Independent variable	over_working	The overage labor of urban older adults = 1, Others = 0
Control variables	age	The actual age of urban older adult (years)
	age2	The actual age of turban older adults squared/100
	gender	Male = 1, Female = 0
	marriage	Marriage = 1, Other = 0
	education	No school = 1, Middle school and below = 2, High school and above = 3
	health	No hospitalization in past year = 1, Others = 0
	social_activity	Involvement in various social activities in the past year = 1, Others = 0
	cognition	The actual value of the word test score
	pension	Receiving a pension or participating in a pension program = 1, Others = 0
	indebt	The logarithm of the actual amount of an individual's debt
Mediating Variables	family_size	Number of households of older persons
	private_health_insurance	Purchased private health insurance = 1, Others = 0
	economic_support_to_others	Financial support for family members = 1, Others = 0
	Indonation	The logarithm of the actual value of in kind or cash donations made to society during the previous year

3.3. Model selection

3.3.1. Conceptual model

In assessing the relationship between overage work and life happiness among urban older adults, we developed a conceptual model that assesses a potentially important factor that may influence whether an individual is an overage urban older adult (see Fig. 1).

Fig. 2 provides a conceptual model we developed to examine the relationship between overage work and life happiness among urban older adults. To simplify the presentation, firstly, the elements of the measurement model, i.e. a complete measurement model was estimated during the empirical evaluation of the conceptual model. Secondly, the effects of age, gender, marriage, education, health, social activity, cognition, pension, indebt, and family size were statistically controlled (i.e. treated as exogenous variables).

It should be emphasized that all paths between all variables in Fig. 2 were estimated during the data analysis phase of this study. However, to highlight the key points, Fig. 2 only provides a link between the core concepts: (1) The age of the urban older adults determines whether they are in the state of retirement, in which the aged standard is 60 years for men and 55 years for women; (2) The urban older adults may still have labor behaviors after retirement, among which, the behavior of participating in non-agricultural labor activities with economic income is classified as overage labor; (3) Overage labor behavior has an impact on the life happiness of the urban older adults.

3.3.2. Ordinary Least-Squares model

Considering that the dependent variable of the study, happiness of life, was continuous, and a large number of confounding factors were controlled in the study. We chose to use Ordinary Least-Squares model to estimate the influence of overage work on happiness of life of the urban older adults. The model was set up as follows:

$$happiness_i = \alpha_0 + \beta_0 over_working_i + \sum \gamma_m X_{mi} + \epsilon_i \# \tag{1}$$

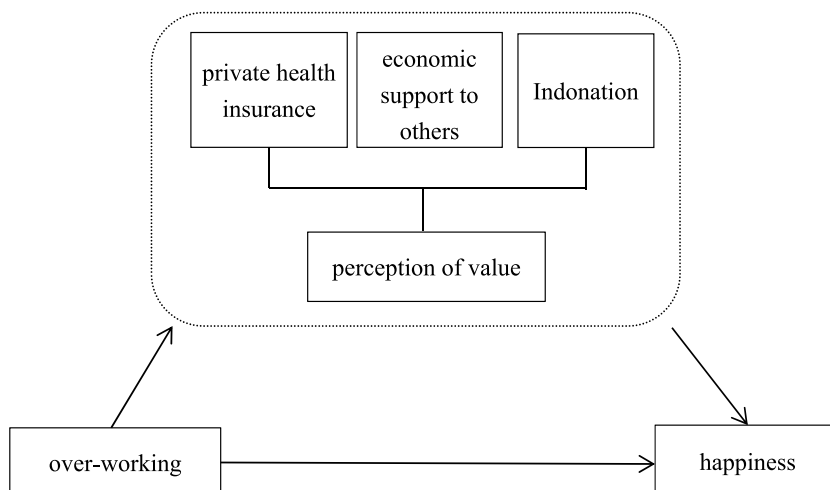


Fig. 1. The relationship between the main variables.

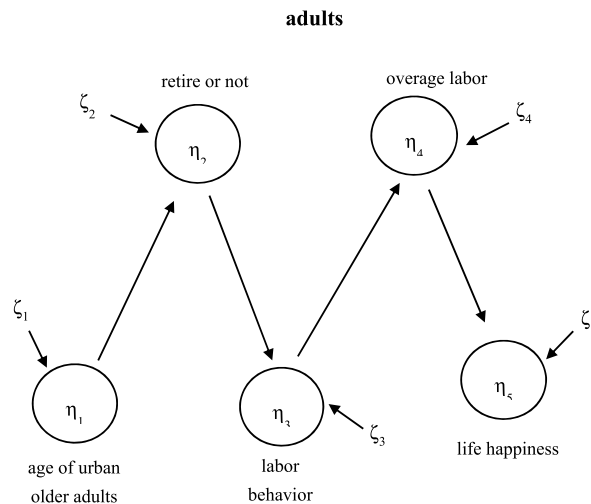


Fig. 2. A conceptual model of overage labor and life happiness of urban older adults.

Specifically, happiness_i refers to the satisfaction of urban older adults on the current happiness of life; over_working_i indicates whether the urban older adults work over age; X_{mi} represents other control variables; ε_i represents the random error term; β₀ is the coefficient to be estimated in this study, which reflects the direction and magnitude of the influence of overage labor on the happiness of urban older adults.

3.3.3. Ordinal logit model

Considering that the evaluation of life happiness score was also a typical ordinal variable, this study used the ordinal logit model for regression. The model was set up as follows:

$$happiness_i = \alpha_1 + \beta_1 over_working_i + \sum \gamma_m X_{mi} + \varepsilon_i \# \tag{2}$$

The meaning of each variable is the same as formula (1).

3.3.4. Propensity score matching model

The labor supply of urban older adults is not random, and it will be affected by many factors. This means that the overage labor may have a self-selection problem, and the difference in life happiness between overage labor and retired older adults may come from the factors affecting the labor supply rather than the labor supply itself. Therefore, to solve the non-random problem of urban overage workers, we used the propensity score matching method (PSM) proposed by Rosenbaum et al. [42]. The basic principle of PSM is to match the individuals of the control group as similar as possible to the individuals of the treatment group according to the probability of obtaining the treatment, to achieve the effect of random treatment. In this study, the treatment group was urban older adults participating in overage labor, and the control group was urban retirees. The specific steps were as follows:

In the first step, the logit model was used to screen the variables affecting the labor supply of urban older adults.

In the second step, the propensity score of the older adults was calculated by the logit model based on the screened variables.

$$PS(X) = P_i\{D = 1|X\} = E\{D|X\} \# \tag{3}$$

Where, D is the dummy variable of whether the urban older adults are overage labor. If the urban older adults are overage labor, then D is 1, otherwise, D is 0. X is the co-variable that affects whether an individual is one of the overage labor. Every given X, the probability of an individual participating in the labor supply is equal.

In the third step, three methods of nearest neighbor matching, core matching and radius matching were adopted respectively. The treatment group and the control group were matched according to propensity score and the effect of overage labor on the life happiness of the urban older adults was calculated.

3.3.5. Mediating effect model

In order to examine the mediating effect and mechanism of value perception from three dimensions, namely, individual, family and society, on the current life happiness of overage labor, this study constructed the following mediating effect model after referring to the research of Preacher et al. [43].

$$value_i = \alpha_2 + \beta_2 work_i + \sum \gamma_m X_{mi} + \varepsilon_i \# \tag{4}$$

$$happiness_i = \alpha_3 + \beta_3 work_i + \theta_0 value_i + \theta_1 W_i + \theta_2 value_i W_i + \sum \gamma_m X_{mi} + \varepsilon_i \# \tag{5}$$

Specifically, $value_i$ represents the perception of value in various dimensions of older adults; W_i is other regulating variables that cannot be ignored but need to be further explored. The value of conditional indirect effect is $\alpha_2(\theta_0 + \theta_2 W_i)$, which represents the mediating influence of various value perceptions after being adjusted by the moderating variables on the life happiness of urban older adults.

4. Results

4.1. Descriptive statistics

Table 2 reports the descriptive statistics of the sample data. The average life happiness score of older adults in Chinese cities was 5.402, which indicates that Chinese urban older adults were generally happy with life. In terms of the labor participations of urban older adults, 15.5% of the urban older adults in China had the phenomenon of overage labor, indicating that overage labor was not widespread among the urban older adults. In terms of other characteristics of the sample, the average age of the sample was 65.931 years. The gender distribution ratio of males was less than that of females, with males accounting for 37.5%. Most of the urban older adults had spouses and their marital status was normal, and the proportion was 79.7%. The average educational level of urban older adults was not high, and most of them were at the level of primary school and junior high school. The majority of urban older adults had not been hospitalized in the past year with 84.6% of the population. The proportion of urban older adults who participated in social activities was 45.9%, which was nearly half. The average score of urban older adults in the word test was 6.139, and this implies that their recognition ability remained ordinary. Most of the urban older adults had received pensions or participated in other pension programs, accounting for 65.4% of the population. There were different degrees of indebtedness among the urban older adults, the overall debt level is low, but the debt level of overage labor is higher than that of other retirees. The average household size of older adults in urban areas was 3.253 people, larger than the size of a couple or a traditional family of three. In addition, the proportion of urban older adults who bought personal medical insurance by themselves was 1.7%, indicating that this behavior was not common among urban older adults. The proportion of urban older adults who provided economic support to their children or parents and parents-in-law was 41.8%, nearly half, accounting for a relatively high proportion of the population. The non-food expenditure of urban older adults in the previous year, including social donations, varied among urban older adults.

There were significant differences in age distribution, sex ratio, marital status, education status, health status, participation in social activities, cognitive ability maintenance level, pension drawing level, debt status, size of family members, purchase of personal medical insurance, economic assistance to family members and social donation of the two groups of urban overage labor and urban retirees having left the working state. These findings provided a basis for further research.

4.2. Benchmark regression

Table 3 shows the regression results of the OLS model and Ologit model used to evaluate the life happiness of urban overage labor. Among them, Model 1 and Model 2 are OLS regression, and Model 3 and Model 4 are ordinal Logit regression.

Model 1 and Model 3 show that, compared with the urban retirees, the evaluation of life happiness of urban overage labor was significantly increased by 0.366 units, and the probability that the urban older adults who still kept working felt satisfied with life was

Table 2
Descriptive statistics.

Variable	Obs	All samples		Different Labor Status		Difference in means
		Mean	Standard deviation	Urban overage labor	Urban retirees	
Dependent variable						
happiness	5010	5.402	2.053	5.711	5.346	0.366***
Independent variable						
over_working	5010	0.155	0.362			
Control variables						
age	5010	65.931	6.694	63.488	66.379	-2.891***
age2	5010	43.917	9.253	40.533	44.538	-4.004***
gender	5010	0.375	0.484	0.522	0.349	0.173***
marriage	5010	0.797	0.402	0.857	0.786	0.071***
education	5010	1.71	0.525	1.845	1.685	0.160***
health	5010	0.846	0.361	0.905	0.836	0.069***
social_activity	5010	0.459	0.498	0.433	0.464	-0.031
cognition	5010	6.139	3.543	6.803	6.017	0.786***
pension	5010	0.654	0.476	0.673	0.650	0.022
Indebt	5010	1.068	3.113	1.427	1.002	0.425***
family_size	5010	3.253	1.67	3.189	3.264	-0.075
Mediating Variables						
private_health_insurance	5010	0.017	0.128	0.030	0.014	0.015***
economic_support_to_others	5010	0.418	0.493	0.512	0.401	0.111***
Indonation	5010	8.355	1.875	8.411	8.345	0.066

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3
Benchmark regression.

	(1)	(2)	(3)	(4)
	OLS	OLS	Ologit	Ologit
over_working	happiness 0.366*** (0.080)	happiness 0.279*** (0.081)	happiness 1.396*** (0.097)	happiness 1.302*** (0.094)
age2		0.000 (0.004)		1.000 (0.003)
gender		-0.012 (0.066)		1.010 (0.058)
marriage		0.218*** (0.077)		1.213*** (0.081)
education		0.129** (0.060)		1.105* (0.058)
health		0.216*** (0.080)		1.211*** (0.084)
social_activity		0.328*** (0.057)		1.325*** (0.067)
cognition		0.082***		1.076***
pension		0.057 (0.062)		1.050 (0.057)
indebt		-0.034*** (0.009)		0.971*** (0.008)
family_size		0.030* (0.017)		1.027* (0.016)
_cons	5.346*** (0.031)	4.015*** (0.242)		
cut1			-1.767*** (0.042)	-0.605*** (0.226)
cut2			-1.280*** (0.036)	-0.092 (0.225)
cut3			-0.713*** (0.032)	0.491** (0.225)
cut4			0.128*** (0.030)	1.356*** (0.226)
cut5			0.658*** (0.032)	1.910*** (0.227)
cut6			1.223*** (0.035)	2.513*** (0.228)
N	5010	5010	5010	5010
R2	0.004	0.044	0.001	0.012

Note: *p < 0.1, **p < 0.05, ***p < 0.01. Robust standard errors are reported. Model 1 and 2 report regression coefficients. Model 3 and 4 report odds ratios.

significantly increased by 39.6%. Both results were significant at the level of 1%. However, Model 2 and Model 4 show that under the control of a series of other variables, compared with other urban older adults, the evaluation of life happiness of urban overage labor was significantly increased by 0.279 units, and the probability that the urban older adults still keeping working felt satisfied with life was significantly increased by 30.2%. Both results were significant at the 1% level.

In addition, the evaluation of life happiness of urban older adults was also affected by other factors. After controlling a series of other variables, the influence of these factors on the life happiness of urban older adults was subject to Model 1 and Model 4. To be specific, normal marital status, higher education level, no unhealthy condition of hospitalization in the past year, active participation in social activities, better cognition ability and the increase of family size all played a significant positive role in promoting the life happiness of urban older adults. Meanwhile, the increase of debt would significantly reduce their evaluation of life happiness. At the same time, drawing pension would not significantly promote the life happiness evaluation of urban older adults. Furthermore, the increase of age could improve the life happiness level of urban older adults, but the effect was very slight and not significant. And the gender of female had an insignificant negative effect on the life happiness of urban older adults.

4.3. Robustness test

The above results indicate that compared with the urban retirees, the urban overage labor perceived higher life happiness. However, the change in the degree of happiness in life might be due to the differences in many aspects between the urban overage labor and the urban retirees, and the labor supply of urban older adults might be non-random. All these factors would make the above findings not reliable. Therefore, if we only use regression analysis to estimate the impact of overage labor on the life happiness of urban older adults, the estimated results would be biased. Therefore, this study will further use PSM for robustness test, so as to solve the possible self-selection problem and enhance the robustness of the conclusion. First of all, based on controlling the control variables,

this study takes the urban older adults participating in overage labor as the treatment group and the urban retirees out of the working state as the control group, that is, it confirms that there is a similar distribution of propensity values between the matched treatment group and the control group after matching. Secondly, in order to test the reliability of matching results, it is necessary to conduct balance test before matching propensity values. Finally, three matching methods, namely nearest neighbor matching, core matching and radius matching, are used to estimate the net effect of labor participation on the life happiness of urban older adults. And multiple matching methods can make the estimated results more reliable.

Table 4 shows that the deviation of all co-variables after matching is less than 10%, and the difference between the treatment group and the control group is not significant, which proves that the balance test has passed. After that, three matching methods were respectively adopted in this study: nearest neighbor matching, kernel matching and radius matching. The results are presented in Table 4.

Table 5 reports the average treatment effects under different matching methods. Among them, the nearest neighbor matching results show that compared with the urban retired older adults, the life happiness score of urban overage labor was significantly higher by 0.358 points. Similarly, the results of nuclear matching and radius matching show that the degree of life happiness of urban overage labor was significantly higher than that of other urban retirees by 0.284 points and 0.361 units respectively, and both were significant at the level of 1%. This was consistent with the original conclusion, which fully proved that the urban overage labor had higher life happiness than the urban retirees, and overage labor could significantly improve the urban older adults' life happiness level.

The above empirical results show that participation in overage labor will make the evaluation of life happiness of urban older adults higher and more positive. For urban older adults, the positive promoting effect of labor participation on their life happiness level is mainly reflected in the realization and improvement of various values. Specifically, in terms of personal value, overage labor makes urban older adults pay more attention to self-care. In terms of family value, the continuous working state enables urban older adults to maintain a certain personal career compared with the urban retirees around and at home, which can provide more care for family members, improve their family status and enhance their sense of responsibility and value in the family. In terms of social value, continuous participation in labor enhances the interaction between the urban older adults and the whole society, so as to participate in

Table 4
Robustness test.

Variable	Unmatched	Mean		Bias%	Reduct	T-value	P-value
	Matched	Treated	Control		Bias%		
age2	U	40.533	44.538	-49.4		-11.22	0.000
	M	40.542	40.668	-1.6	96.9	-0.39	0.697
gender	U	0.522		35.5		9.24	0.000
	M	0.349		-2.6	92.5	-0.51	0.611
marriage	U	0.521					
	M	0.534					
education	U	0.857		18.7		4.54	0.000
	M	0.786		-2.7	85.5	-0.59	0.556
health	U	0.857					
	M	0.867					
social_activity	U	1.845		31.6		7.88	0.027
	M	1.685		-0.3	99.2	-0.59	0.556
pension	U	1.842					
	M	1.844					
indebt	U	0.905		20.6		4.91	0.000
	M	0.836		0.4	98.1	0.09	0.931
family_size	U	0.903					
	M	0.433		-6.2		-1.59	0.113
cognition	U	0.464					
	M	0.434		-4.0	35.1	-0.79	0.428
pension	U	0.454					
	M	6.803		22.6		5.70	0.000
indebt	U	6.017					
	M	6.791		-2.7	88.2	-0.53	0.596
family_size	U	6.884					
	M	0.673		4.7		1.21	0.227
family_size	U	0.650					
	M	0.672		-0.5	88.5	-0.11	0.914
indebt	U	0.674					
	M	1.427		12.7		3.50	0.000
family_size	U	1.002					
	M	1.415		1.0	91.9	0.19	0.847
family_size	U	1.381					
	M	3.189		-4.6		-1.15	0.251
family_size	U	3.264					
	M	3.192		0.8	83.6	0.15	0.877
family_size	U	3.180					
	M						

Table 5
Average treatment effect of the treatment group.

Matching method	Treatment group	Control group	ATT	Boot standard error	T-value
Nearest neighbor match	5.709	5.351	0.358***	0.121	2.97
Kernel match	5.709	5.425	0.284***	0.098	3.39
Radius match	5.709	5.348	0.361***	0.131	2.76

Note: *, **, *** indicate significance at the 10%, 5%, and 1% levels respectively; The standard error in column 4 after matching is calculated 500 times by bootstrap.

social activities and make social contributions. In this process, the sense of social responsibility is also enhanced. In addition, the extra income brought by overage labor provides the financial basis for urban older adults to realize the above three values.

4.4. The value perception and its mediating effect

After it is clear that overage labor will improve the life happiness of urban older adults, it is necessary to further analyze the specific mechanisms. As previously analyzed, participation in overage labor may promote the life happiness of urban older adults by enhancing their perception of value in different dimensions, which are embodied in individual, family and social dimensions. Firstly, compared with the retired urban older adults, the urban older adults taking part in overage labor have a more positive attitude towards life and are more inclined to obtain a sense of value through the realization of personal goals, thus forming a higher happiness of life. Secondly, the urban older adults who continue to participate in labor usually include the economic demands of their families into their personal economic behavior goals. At the same time, this group will also have more additional income due to the maintenance of labor status, which helps the urban older adults to provide economic support to their families, promote the realization of their sense of family value, and thus improve their happiness level of life. Thirdly, compared with the retired urban older adults, the urban older adults keeping working have higher social status and participate in social activities more often. Combined with the guidance of public opinion in Chinese society, they are more inclined to make contributions to society, which also contributes to the improvement of their happiness in life.

Based on these possible influencing mechanisms and the availability of data, this study selected whether the older adults in urban areas had purchased private medical insurance by themselves to measure the sense of the value of older adults in the personal dimension (private_health_insurance). After that, the sense of value in the family dimension was measured by whether the urban older adults offered economic support to their children or parents in the previous year (economic_support_to_others). Finally, the non-food consumption expenditure of the previous year including donations in kind or cash to the society was selected as the proxy variable of the social dimension of the sense of value of urban older adults (Indonation). And based on these variables, the mediation effect analysis was conducted.

Considering the weak efficacy of stepwise method in testing the mediation effect, bootstrap method, which has been considered more reliable in recent years, was selected to test the mediation effect [44]. The test results are shown in Table 6. It can be seen that the direct effects of the three dimensions of value perception are all positive, and the upper and lower values of Boot CI do not contain 0. Although the indirect effects of the three dimensions of value perception are also positive, the confidence interval contains 0, which indicates that the three types of value perception play a positive and direct mediating role between the labor participation of urban older adults and their life happiness level.

5. Discussion

The positive effect of overage labor on the life happiness of the urban older adults has important practical significance for the construction of a positive aging society. In addition to individual value perception, the mediating role of family and social value perception in the relationship between overage labor and life happiness of the urban older adults expands the connotation of self-actualized value in Maslow's hierarchy of needs theory [39].

Firstly, under the background of accelerated urbanization and aging, the life happiness of the urban older adults has a direct impact on the overall happiness level of the nation: On the one hand, the number of the urban older adults is increasing, and the proportion of

Table 6
The results of mediating effect analysis.

Mediating variables	Type of effect	Value	Boot standard error	LLCI	ULCI
private_health_insurance	Direct mediating effect	0.274	0.080	0.125	0.428
	Indirect mediating effect	0.005	0.004	-0.001	0.016
economic_support_to_others	Direct mediating effect	0.272	0.081	0.109	0.431
	Indirect mediating effect	0.007	0.005	-0.001	0.018
Indonation	Direct mediating effect	0.278	0.002	0.123	0.425
	Indirect mediating effect	0.001	0.079	-0.002	0.005

Note: LLCI: Lower Limit of Confidence Interval; ULCI: Upper Limit of Confidence Interval; The upper and lower limits of Boot CI were calculated with $p < 0.05$.

their evaluation of happiness of life is gradually increasing. On the other hand, as an important component of the family structure, the decrease of the happiness of the older adults will directly drag down the happiness perception of other family members, and then lead to the overall decline of the national happiness level. The conclusion that continuing to participate in labor after reaching the retirement age can improve individual happiness of life shows that overage work within the ability range can not only reduce the burden of family support and relieve the social pressure of care for older adults, but also directly and effectively improve national happiness.

Secondly, With the extension of human life span, the problem of aging is no longer just a matter of physical health and life security, but a problem of value perception. The conclusion that overage work can bring positive personal value perception shows that, under the condition of physical permit, older adults people can participate in social and economic activities according to their own abilities, needs and preferences, and achieve a higher sense of personal accomplishment, which helps older adults people to affirm their self-worth [45], promote them to have a more positive attitude towards aging [46], and then make them have a more positive outlook on life. Therefore, the active aging attitude of the urban older adults brought about by overage work can prompt them to pay more attention to the pursuit of personal value and tend to engage in higher self-care.

Thirdly, under the background of accelerated population aging, continuing to work after retirement is an important content of the construction of a positive aging society. As long as the older adults actively participate in the development of their families, communities and societies, advancing age does not become a direct factor in slowing down social development. Continuous participation in labor can help the older adults maintain social activity, greatly affect people's life course, effectively delay aging [47,48], forming a virtuous cycle. In China, private medical insurance is a big expense, so most people choose to buy relatively cheap public medical insurance, and only a few people will take the initiative to buy private medical insurance. The older adults' self-funded purchase of private medical insurance can effectively reflect their positive and optimistic attitude towards aging, which is a direct expression of the older adults' self-care.

Fourthly, the self-actualization needs in Maslow's hierarchy of needs theory should not only involve the realization of individual value, but also the realization of family and social value. Unlike the rational economic man hypothesis, a person is a person who lives in a social group. As an old Chinese saying goes, "If you are poor, you will be alone, and if you are successful, you will be good in the world." Supporting family members or helping vulnerable groups in society can effectively enhance one's sense of worth. The positive mediating effect of family and social value perception on the relationship between overage work and life happiness of the urban older adults is the direct reflection of this content. On the one hand, under the strong influence of traditional Chinese culture, the goals of parents and children in Chinese families tend to be highly consistent, the financial behaviors of the whole family are a whole [49], Individual labor practices often include the demands of other family members [50]. Parents, in particular, are more likely to give a lot to their children's generation financially [51]. Research has shown that this inter familial financial support behavior is believed to have a positive impact on older adults' psychological health [52]; On the other hand, Chinese government and society have been encouraging and supporting individuals to actively participate in charity work, the income generated from overage work not only provides the material basis for the urban older adults to participate in social donation, but also enables them to obtain good self-recognition and respect from others through social donation, and maintain a higher social status and better social activity [47]. The superposition of willingness and ability enables urban older adults to feel more social value perception through the act of donation, and thus also reap a higher sense of happiness in life.

The superposition of willingness and ability enables overage workers to feel more social value through donation behavior, and reduces the negative impact of retirement on their aging attitude and mental health [53].

6. Conclusions

The happiness of urban older adults in China has become a significant social topic and research issue due to the dual effects of rapid urbanization and deep aging. As a result of the delayed adjustment of retirement age and the gradual increase of life expectancy, especially healthy life expectancy, urban older adults in China have developed a wide range of demands to continue working. Then, what are the implications of overage labor on them? Based on the CHARLES dataset, this study examined the relationship between the maintenance of labor status and the happiness in the life of the urban older adults. Moreover, it also explored the possible mediating function of value perception across the individual, family and society dimensions. The empirical results showed that urban overage older adults who continued to participate in labor had higher life happiness compared to urban retired older adults who were out of labor status. Through the mediation effect test, this study also found that the higher level of life happiness of urban overage labor came from their value perceptions in personal, family, and social dimensions.

Finally, it is worth noting that this study could not examine or discuss certain variables that may have an impact on the estimated results due to limitations such as data availability. For example, the aging attitudes of older adults have been mentioned, which may affect both happiness in life and labor participation of older adults. This suggests that older adults who hold a positive attitude tend to be happier with their lives and are more likely to participate actively in the labor force. As another example, some scholars have pointed out that genes, personality, and the cultural and institutional environment in which they live can also have an influence on the psychological status of older adults. In conclusion, the limitations of the study were caused by data restrictions. As a future step, it is proposed to conduct a related study through independent data collection.

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Availability of data and materials

The data are publicly available. The datasets used and/or analyzed during this study can be available online at CHARLS [<https://charls.pku.edu.cn/>].

Ethical statement

The China Health and Retirement Longitudinal Study (CHARLS) was a survey approved by the Ethical Review Committee of Beijing University, and all participants signed informed consent at the time of participation. There is no need for additional ethics approval for the approved data users. The study was carried out in accordance with relevant guidelines and regulations.

Consent for publication

Not applicable.

Author contribution statement

Li He: Conceived and designed the experiments; Contributed analysis data; Performed the experiments; Wrote the paper.

Zoujie Xu: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Guo Chen: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Jiangyin Wang: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Jinxu Zhao: Analyzed and interpreted the data; Wrote the paper.

Zixian Zhang: Analyzed and interpreted the data; Wrote the paper.

Yang: Analyzed and interpreted the data; Wrote the paper.

Shaocheng Shi: Contributed analysis tools; Wrote the paper.

Liyuan Zhang: Contributed analysis tools; Wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no competing interests.

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