

Does Internet Use Promote 'Active Ageing'?

-- A Study Based on 2016 China Longitudinal Aging Social Survey

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Abstract: The rapid development of Internet technology has not only expanded the intergenerational interaction between the elderly and their children but also diversified the social participation and entertainment of the elderly. Based on the 2016 data released by the China Longitudinal Aging Social Survey, this paper used traditional regression and PSM methods to investigate the influence of Internet use on elderly people's provision of care and participation in social volunteer services from the perspective of "active ageing", and conducted a robustness test. The analysis found that Internet use has a significant positive effect on the 'active ageing' of older people and that the use of smartphones to access the Internet can also have a positive effect. In the context of the country's vigorous promotion of "Internet Plus" for the elderly, it is important to actively carry out "ageing-friendly" renovation of relevant Internet facilities, encourage the elderly to access and learn to use the Internet, and increase their Internet usage rate.

Keywords: Internet, Ageing well, Active ageing.

1. Introduction

According to the 7th census in 2020, 18.7% of the population is over 60 years old, an increase of 5.44% compared to 2010. With the development of science and technology and the improvement of the level of social productivity, the requirements of various social and economic activities for physical factors have gradually faded, and the elderly are no longer synonymous with "useless" or "burden". General Secretary Xi pointed out that old age is an important stage of life and that it is still possible to make progress and achievements. Older people can still participate in society, serve society and bring their values. Although China's population is ageing rapidly, a large proportion of old people are of lower age, so there is more potential and scope for active ageing. Whether the value of the "silver-age" generation can be identified and brought into play has a bearing on the country's economic growth potential and profoundly affects the sustainable development of the economy and society.

As individuals get old, they have more leisure time, providing an opportunity to be influenced by new media. At present, China has made remarkable achievements in the development of the Internet and the Internet penetration rate has been rising. The 48th Statistical Report on the Development of the Internet in China shows that as of June 2021, the group of Chinese Internet users aged 60 or above accounted for 12.2% of the overall Internet users. The popularity of the Internet will have a multifaceted impact on the lives of the elderly, and it has become possible for the Internet to promote the social value of the elderly. This paper takes the study of the relationship between the use of the Internet and the participation of the elderly in social volunteering as an entry point, intending to provide feasible countermeasures and suggestions in the areas of elderly service innovation, technology application and policy formulation, to promote the development of "active ageing".

2. Basic Concept and Literature Review

The Chinese concept of 'active ageing' is broadly equivalent to the Western concept of productive ageing. [1] Productive ageing refers to the contribution that older people make contributions to society through a range of activities. [2] The theory of productive ageing changes the stereotype of older people as useless and dependent on others [3][4] and sees them not only as recipients of social services [5] but also as an 'asset' and an important force for social and economic development. Western scholars have often defined the scope of 'productive' activities in productive ageing more narrowly, and Thanakwang relies on Walker and Avant's conceptual analysis to conclude that the activities of productive ageing should include work, caring for others, participation in social activities and spiritual growth. [6] is widely accepted by scholars. accepted by scholars. The scope of work encompasses not only formal, paid work, but voluntary, unpaid work is also seen as part of productive participation. Caregiving is mainly provided within the family, e.g. childcare, and caring for a spouse [7][8]. Spiritual growth emphasises concrete contributions to others and society through inner spiritually oriented, humanistic philosophical activities. Giving advice and imparting knowledge, experience and skills to others are seen as productive ageing activities. [9]

As the trend of ageing in China continues to deepen, the value and role of the elderly population has been increasingly brought to the attention of Chinese scholars. Most scholars have discussed the value and significance of "active ageing". They believe that the elderly are still a social force to be reckoned with and that "active ageing" is an objective requirement for China to cope with the ageing of the population. [10]; Sun Juanjuan believes that active ageing can activate the secondary dividend of our population. [11] Some scholars have also explored the development and changes of "active ageing" in China from the perspective of historical development [12][13][14]. Most of the current studies are

based on the "elite" and conditional "active ageing", and less on the universal "active ageing". For example, Cai Erected explored the social value of older intellectuals through re-employment and other ways to participate in social development. [15]; scholars Li Jeming and Ai Hui focused on the situation of "active ageing" of retired university staff. [16]. In addition, there is a lack of empirical research on the factors influencing "active ageing" and how to promote the realization of "active ageing".

The positive effects of the Internet on older people as a convenient channel for information transfer are recognised by a wide range of scholars. Jin Yongai and other scholars point out that older people who use the Internet have significantly better health, whether using self-rated health, health status compared to their peers, or health status compared to the previous year. Similar conclusions were reached by Zhao et al. Can the Internet bring out the social value of older people? Scholars have not yet reached a consensus. Using Internet penetration as an instrumental variable, Lv Mingyang et al. confirmed that Internet use promotes the re-employment of older people by facilitating social interaction and improving health. [17]Li Dong and other scholars, on the other hand, argue that the Internet reduces the overall probability of re-employment for older people, but for highly educated, low-income and physically fit older people, Internet use promotes employment participation and increases the supply of human resources. [18]

Compared to previous studies, the main innovation of this paper is to frame the use of 'active ageing' and the Internet within an analytical framework. This paper considers the role of the emerging technologies of the Internet in enabling older people to fulfil their values and achieve "active ageing" through the provision of care and participation in voluntary activities.

3. Study Design

3.1. Data Sources

This study used data from the 2016 China Longitudinal

Aging Social Survey by Renmin University of China. The survey used mapping sampling to select Chinese citizens aged 60 years and above from 476 villages/residential committees in 30 provinces/autonomous regions/municipalities directly under the Central Government.

Dependent variable

Chose volunteering and providing care for others to measure 'active ageing'. This is operationalised as social security patrols / caring for other older people / environmental health protection / mediating disputes / chatting with others / volunteering where expertise is needed (e.g. medical consultations) / helping to look after other people's children. In this study, the social value of older people is measured by taking a value of 1 for having participated in at least one of the above activities and 0 for never having participated.

Independent variable

The independent variable in this study is Internet usage. The responses to the question "How have you used the Internet in the past three months" in the CLASS questionnaire were used for measurement. "Never", "Rarely" "Sometimes", "Often" and "Always" were recorded as no. "Sometimes", "Often" and "Always" were recorded as yes.

Control variables

In the empirical analysis, this paper controls for individual characteristics, family status, social support and health status of older people that may affect the results. Individual characteristics include age, gender, education and type of household. This study grouped older people by age according to the WHO age classification criteria of long-lived elderly people, elderly people and younger elderly people. The family status dimension included the presence or absence of a spouse and the number of children. Social support looked at whether the older person had a job, personal income in the last year, social security status and the number of properties. Social security included old-age insurance benefits, minimum subsistence allowance, old-age allowance, and subsidies for home care services.

The values and descriptive statistics for each variable are shown in the table below.

Table 1. Variable Definition

	Variable	Description	Mean	Std. Dev.
Dependent variable	Active ageing	Participate in = 1; Don't participate in = 0	0.163	0.369
Independent variable	Internet usage	Using = 1; Do not use the = 0	0.101	0.301
Individual characteristics	Gender	Men = 1; Women = 0	0.508	0.500
	Age	Long-lived =2; Older=1; Younger=0	0.286	0.484
	Education	College or above =15; High School/Technical Secondary =13; Junior high school = 9; Primary school/private school/literacy class =6;	6.586	3.947
	Hukou	Agricultural hukou =1; Urban hukou =0	0.554	0.497
Family	Couple	Having a spouse =1; Unmarried/widowed/divorced =0	0.710	0.454
	Children	Number of children of respondents	2.612	1.399
	ADL	Activities of daily living	11.795	2.498
Health	IADL	Instrumental activity of daily living	10.241	2.808
	Chronic diseases	Sick = 1; Don't sick = 0	0.568	0.495
	Exercise	Participate in = 1; Don't participate in = 0	0.154	0.361
	Peer health Comparison	Much better =1;Better =2; Almost the same =3; Worse =4; Much worse =5	2.901	0.829
Social support	Work	Having a job =1; No job = 0	0.125	0.330
	Income	The logarithm of last year's personal income	9.112	1.499
	Social security	Participate in = 1; Don't participate in = 0	0.851	0.356
	House property	Owning 2 or more properties =2; One property =1; No property = 0	0.957	0.367

4. Empirical Analysis

4.1. Regression Analysis

A stepwise regression analysis was used to gradually add

all four variables of individual characteristics, family status, health level and social support to analyse the impact of internet use on older people's participation in social volunteering.

Table 2. Regression Analysis

		(1)		(2)		(3)		(4)	
		Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
Individual characteristics	Internet usage	0.865***	-0.106	0.792***	-0.107	0.695***	-0.11	0.695***	-0.12
	Gender	0.0037	-0.0792	-0.017	-0.0806	-0.0109	-0.0822	0.0424	-0.0939
	Age	-0.131	-0.0961	0.0232	-0.104	0.0806	-0.109	0.0581	-0.123
	Education	0.0368***	-0.0119	0.0333***	-0.012	0.0302**	-0.0123	0.0285**	-0.0144
	Hukou	-0.518***	-0.0905	-0.428***	-0.0929	-0.382***	-0.0944	-0.490***	-0.119
Family	Couple			0.01	-0.0986	-0.0348	-0.101	-0.156	-0.114
	Children			-0.161***	-0.0361	-0.156***	-0.0366	-0.112***	-0.0418
Health	ADL					0.0401	-0.0299	0.0485	-0.0335
	IADL					-0.018	-0.0284	-0.0045	-0.0315
	Chronic diseases					-0.232***	-0.084	-0.0488	-0.0969
	Exercise					0.576***	-0.0981	0.599***	-0.108
	Peer health Comparison					-0.0980*	-0.0539	-0.204***	-0.0611
Social support	Work							0.442***	-0.121
	Income							-0.0399	-0.0375
	Social security							0.339**	-0.158
	House property							0.232	-0.143
Constant		-1.710***	-0.119	-1.373***	-0.159	-1.349***	-0.316	-1.625***	-0.533
Observations		4886		4866		4777		3710	
Pseudo R-square		0.0462		0.0509		0.0636		0.0749	

With the addition of the control variables, the regression results for the core explanatory variables were always statistically significant at the one per cent level and the regression coefficients were positive. The control variables also have a significant effect on 'active ageing'. Education significantly contributes to the social value of older people, and the longer the years of education, the greater the likelihood of 'active ageing'. Participation in social volunteering is higher among older people in urban households than among older individuals in rural households. Older people who are currently working are significantly more likely to participate in social volunteering than those who are not working. In addition, older people with higher incomes have a higher propensity to participate in social volunteering. The number of properties and the ability to do basic activities did not show a significant correlation with older people's social volunteering participation.

4.2. Robustness Tests

To check the robustness of the results, a substitution study

was used, replacing the dependent variable, and the core explanatory variables and conducting the regression analysis again. The extent to which older people fulfil their values is also reflected in the type of social volunteering they engage in. The CLASS survey also asked respondents how much they identified their values. That is, "I feel that I am still a useful person to society". Models 1 and 2 replaced the dependent variable with the number of items of volunteering and the degree of identification with one's values, respectively. Considering that the majority of Internet users use mobile phones to access the Internet, this study uses the presence or absence of a smartphone as a proxy variable for Internet use status for regression analysis (Model 3). In addition, the original dichotomous variable of usage status was replaced and regressed using frequency of Internet use (Model 4). The results show that, similar to the baseline regression results, internet use consistently and significantly positively affects older people's participation in social volunteering at the one percent statistical level, regardless of whether the dependent variable or the core explanatory variable is replaced.

Table 3. Robustness Tests

	(1)	(2)	(3)	(4)
Use Internet	0.0770***	0.303***		
	-0.0263	-0.0541		
Use smartphone			0.130***	
			-0.0167	
Internet usage frequency				0.0610***
				-0.00674
Control variables	yes	yes	yes	yes
Constant	0.193**	2.934***	0.193***	0.0947
	-0.0969	-0.225	-0.0714	-0.0721
Observations	3710	3428	3710	3710
R-squared	0.041	0.072	0.076	0.081

4.3. PSM Analysis

In this paper, we have chosen the propensity value matching method, which uses proximity matching, radius matching and kernel matching to solve the data self-selection problem and reduce the interference of endogeneity in the results. The propensity matching analysis method requires the matched samples to satisfy the balance. In this study, the

samples were tested for balance using proximity matching, radius matching and sum matching. The results of the tests in the table below show that the level of differentiation of the control variables between the matched Internet-using group and the non-Internet-using group is significantly lower, with deviations within 5%, and the balancing hypothesis is satisfied.

Table 4. Propensity Score Matching Results

	Nearest Neighbor Matching		Radius Matching		Kernel Matching	
	Bias	P	Bias	P	Bias	P
Gender	0.8	0.905	1.9	0.767	-0.5	0.936
Age	-2.0	0.635	-1.2	0.78	-2.4	0.564
Education	1.7	0.76	0.4	0.942	2.8	0.625
Hukou	-0.3	0.954	0.2	0.971	-1.9	0.707
Couple	-2.4	0.676	-0.1	0.988	0.1	0.988
Children	0.4	0.944	-0.3	0.955	-3.2	0.524
ADL	0.2	0.921	-0.6	0.814	-0.9	0.727
IADL	-1.2	0.723	-0.7	0.835	-1.9	0.568
Chronic diseases	2.6	0.684	-2.3	0.719	-2.4	0.703
Exercise	-4.6	0.53	-2.2	0.766	-2.4	0.745
Peer health Comparison	-1.2	0.847	-3.2	0.608	-4.2	0.499
Work	-3.3	0.625	-4.0	0.562	-1.7	0.798
Income	3.7	0.507	0.8	0.888	4.4	0.433
Social security	2.6	0.778	0.4	0.952	1.1	0.859
House property	1.0	0.877	2.3	0.729	2.3	0.730

The results of the analysis of Internet use on older people's social volunteering participation showed a strong consistency across different matching methods, with a significant positive effect of Internet use on older people's social volunteering participation. The mean treatment effects obtained for nearest neighbor matching, radius matching and kernel matching

were 0.1211, 0.1335 and 0.1287 respectively, with a mean value of 0.1278, indicating that the use of the Internet led to an average increase of 0.1287 units in older people's social volunteering participation, conditional on the same control variables. The propensity score matching results are consistent with the results of the regression analysis above.

Table 5. Average Treatment Effect

	Use	Nonuse	ATT	T
Nearest Neighbor Matching	0.3662	0.2451	0.1211	4.22***
Radius Matching	0.3620	0.2285	0.1335	5.10***
Kernel Matching	0.3662	0.2375	0.1287	5.03***

5. Conclusion and Discussion

Based on the 2016 data published in the China Social Tracking Survey of the Elderly, this paper examines the impact of internet use on the provision of care and participation in social volunteering by older people, using traditional regression and propensity matching methods, under the perspective of "active ageing". The findings of the study are as follows.

Firstly, Internet use has a significant positive effect on the achievement of 'active ageing'. After adding four control variables for individual characteristics, family status, health level and social support, internet use has a statistically significant positive effect on the provision of care and participation in voluntary social activities by older people at the 1% level. Secondly, smartphones play a similar role to the

internet and also show a significant positive effect on the achievement of 'active ageing'. This may be explained by the increasing penetration of smartphones and the fact that mobile phone access is the main form of internet use for older people. Thirdly, years of education, type of household registration, number of children and physical activity also limit the achievement of 'active ageing'.

1. Broaden the Internet access for the elderly, incorporate the Internet into the scope of the infrastructure construction of elderly services, strengthen the training of Internet applications, increase the usage rate of the Internet for the elderly while improving the way the elderly are cared for through online and offline interaction, and encourage the elderly to participate extensively in social activities, enhance the level of social adaptation and effectively increase their life satisfaction.

2. Establish an elderly care service system and protection system that can meet the needs of different groups of elderly people. Develop various types of intelligent products that meet the characteristics of the elderly, satisfy their needs and apply to their living scenarios. Take technology to the elderly and technology for the elderly as the leader, and build a smart elderly care platform that is jointly built and shared by multiple entities.

There are several shortcomings in this study: firstly, in terms of the indicators of 'active ageing', although the indicators selected already cover the provision of care and participation in social volunteering, they do not cover work status and spiritual growth due to the availability of data. In the future, a richer set of indicators should be selected to further test the promotion of 'active ageing' on the Internet. Secondly, this paper only uses one-year survey data, which does not allow us to test the time variation of the results.

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