Widowhood and the Subjective Well-Being of Older People in China: the Mediating Effects of Lifestyle

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Abstract

Previous research has illustrated that lifestyle is correlated with widowhood and subjective well-being amongst older people; however, few studies have examined the mediating effects of lifestyle behaviors on the relationship between widowhood and subjective well-being. As China has a large number of widowed older people, we sought to examine which lifestyle behaviors are associated with better (or worse) subjective well-being amongst widows. Using data from the 2013 Chinese General Social Survey (CGSS), this study uses ordered logit model (OLM), propensity score matching, and mediation analyses to explore the relationship between widowhood and subjective well-being, particularly the mediating effects of the three lifestyle dimensions: recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends. We found that the lifestyles of widowed older adults differed from those with spouses: the frequency of leisure time and frequency of media use by widowed older adults were lower than those with spouses. Widowhood demonstrated a significant negative correlation with the subjective well-being of older adults. The frequency of leisure time activity had a partial mediating effect between widowhood and subjective well-being. Our results reveal a direct positive relationship between the frequency of leisure time and subjective well-being amongst widowed older adults. These findings have important implications for improving the experience of widowhood through lifestyle interventions.

Keywords Widowhood · Lifestyle · Subjective well-being · Mediation effects · Older people · China

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Introduction

In China, both the number and the proportion of older adults have increased rapidly in recent years. In 2010, there were 178 million people aged 60 and above in China, accounting for 13.26% of the total population (PCO 2012). It is estimated that by 2030, China's older adult population will reach 358 million, comprising approximately 25% of the total population. This proportion is expected to grow to 36.5% by 2050, ushering China into a super-aging society (United Nations 2015). With the growth in the population and the proportion of older people, the number of widowed older adults in China has also increased. The 2010 population census data demonstrates that China's widowed older adult population was 47.74 million, representing 26.89% of the older adult population (PCO 2012). It is predicted that China will have a widowed population totaling 118.4 million by 2050 (Wang and Ge 2013).

It is well documented that for older adults, the spouse is the primary provider of daily care and spiritual consolation and that the support of a spouse is irreplaceable (Dykstra 1995). Quality of life, health status and self-perception can all be influenced by spouses (Perrig-Chiello et al. 2015). Widowed older adults are lonelier than married ones and their subjective well-being (SWB) may be poorer (Utz et al. 2014). In China, declining family sizes, a result of both stringent birth control policies and population mobility, have made "empty nest families" quite common. The death of a spouse transforms older adult empty-nesters into older adults who live alone. In addition, China's older adults generally have lower levels of education, poorer economic status and stronger dependence on families than younger people; therefore, widowhood may be a greater challenge for the older adults in China than in other countries. The deprivation of the primary provider of social and emotional support of widowed older people may lead to social isolation (Somhlaba and Wait 2008). Widowhood means not only a change in marital status but also a lifestyle adjustment that affects older adults' quality of life, especially their SWB.

The death of a spouse is one of the most stressful of all life events (Scannell-Desch 2003; Bennett and Soulsby 2012; Hahn et al. 2013) and it has a significant negative correlation with the SWB of older adults (Sheldon and Lyubomirsky 2012; Sun et al. 2016), a correlation that increases as individuals age. However, widowed older adults may alter their lifestyles in order to acclimatize themselves to widowhood (Carr and Utz 2001; Scannell-Desch 2003; Wilder 2016). Older people deprived of spousal support may change aspects of their lifestyle, such as social participation, recreational involvement, and social interaction (Strain et al. 2002; Utz et al. 2002; Ong et al. 2010), all of which are related to their SWB. Social participation, recreational involvement, and social interactions are positively associated with the SWB of widowed older adults (Lennartsson and Silverstein 2001; Huang and Humphreys 2012). This study compares the differences in lifestyle behaviors between the widowed older adults and those with spouses, examining the relationship between widowhood and the subjective well-being of older adults and the mediating role of the lifestyle behaviors.

Using data from the 2013 Chinese General Social Survey (CGSS), this study explores the influence of widowhood on the SWB of older adults, with a focus on the mediation effects of lifestyle (namely recreational involvement, media use, and interaction with relatives and friends). The objectives of the study are to 1. examine the

bivariate associations among widowhood, three types of lifestyle, and SWB in older people in China, and 2. examine the mediating effects of lifestyle on the relationship between widowhood and SWB in older people of China.

Background

Subjective well-being is an important indicator of quality of life, which considers an individual's self-awareness and subjective evaluations of their life as a whole or of its various domains, including positive feelings such as happiness and pleasure, and negative feelings such as pain, worry, and anger (Diener et al. 1999; Diener 2012; Oshio 2012). It has most often been assessed using measures of life satisfaction, happiness, and self-esteem (Pinquart and Sorensen 2001).

The relationship between widowhood and SWB is equivocal. Widowhood has been associated with the worsening of depression in individuals who are already depressed (Lucas 2007; Fried et al. 2015), and reductions in quality of life (Wu and Hart 2002). Widowed older adults are less likely to adopt a healthy lifestyle due to a lack of care and help from spouses. They may also suffer from greater social isolation than their non-widowed peers (Tiedt et al. 2016), resulting in lower SWB (Duncan et al. 2006; Ho and Hung 2013; Li et al. 2016). Although widowhood negatively affects the SWB of older people, it has been suggested that this influence is transient (Uglanova and Staudinger 2013). Although an individual temporarily has a lower SWB after losing their spouse, they will adjust their lifestyle (Carr and Utz 2001; Wilder 2016) and their SWB will soon return to its previous level. Certain studies also suggest that widowhood exerts no effect on the SWB of older adults because the SWB of an individual hovers around a biologically determined set point that rarely changes (Fujita and Diener 2005). It has also been argued that although widowed older adults lose the social roles associated with marriage, they are likely to increase their social participation, which enhances their SWB (Utz et al. 2002). In addition, the loss of a spouse may cause widowed older adults to develop adaptive strategies, thus advancing their SWB (Wade et al. 2016). In short, no consensus exists on the effects of widowhood on one's SWB.

Lifestyle refers to individual behavioral characteristics, including how a person spends their leisure time and the various activities in which they engage. However, previous studies have not defined lifestyle unanimously, with some applying the term to only one activity such as smoking, drinking, exercise, or recreation. Most previous research indicates that lifestyles are closely related to widowhood and the SWB of older people.

Many theories and empirical analyses have examined the correlation between widowhood and the lifestyles of older adults. The activity theory (Utz et al. 2002) suggests that widowed people will engage in more frequent social participation, whereas the disengagement theory holds that as they age, people will gradually disengage from social activities and decrease their social participation. The continuity theory (Utz et al. 2002) states that a person's actions throughout their life generally remain comparatively stable and that despite the hindering effects of the aging process, older adults will retain their lifestyles and life attitudes as continuously as possible (Strain et al. 2002). Relevant empirical studies support the three above-mentioned theories to different extents. One study argues that after an individual's spouse dies,

their social ties and social networks will change (Perrig-Chiello et al. 2015), depriving them of many social roles. In order to maintain their original identity, they will take new actions to replace lost social roles, so their formal and informal social participation may actually increase (Utz et al. 2002). After being widowed, the formal social participation of older adults increases, as does their informal social participation. Some studies have elucidated the role of gender in differential experiences of widowhood (Sasson and Umberson 2014). The findings also reveal that widowed men may engage in more physical activities (Utz et al. 2002; Stahl and Schulz 2014). As noted by Hershberger and Walsh (1990), widowers will increase their interaction with friends and have higher life satisfaction at the beginning of widowhood. Widowed women will spend more time with friends than non-widowed to compensate for the loss of intimacy. It has also been argued that there will be a distinct decline in an individual's active social participation in the first three years of widowhood (Ong et al. 2010). The death of a spouse also affects people's leisure life (Strain et al. 2002). At least one study contended that the frequency of participation in recreational activities by the widowed decreases remarkably compared to the non-widowed, and widowed women turn to harmful lifestyle choices such as smoking and excessive drinking (Li et al. 2016).

Some research has discussed the influence of activities such as daily physical exercise, recreational participation, and media use on the SWB of older people (Boniel-Nissim et al. 2015; Wheatley and Bickerton 2017). It was suggested that daily physical exercise and other healthy behaviors help boost the life satisfaction of older adults (Huang and Humphreys 2012) and that more participation in physical activities can notably promote their SWB. According to another study, recreational involvement is a vital factor in enhancing SWB, especially for older people. Recreational involvement can promote the long-term happiness and health of an individual. Hence, if older adults are able to participate in leisure activities, their life satisfaction and SWB may be enhanced (Lennartsson and Silverstein 2001). Cultural activities and family recreation also facilitate older people obtaining higher SWB (Brajša-Žganec et al. 2011). A study by Gross et al. (2002) indicates that owning and using media also makes people happier. It has also been shown that new media such as the internet, entertainment media, mobile phones, and interactive cable television may enable a marked improvement in people's quality of life (Kavanaugh et al. 2005). The more new media are adopted, the higher a person's evaluation of their quality of life may be, which may result in higher SWB. In contrast, some media content has been shown to generate a negative impact on the SWB of the participant (Wei 2010).

Although the effects of lifestyle on widowhood and SWB have been discussed, previous studies have not applied the concept of lifestyle behaviors consistently, for example, using the term one-dimensionally to refer to smoking, drinking, exercise, and recreation (Huang and Yin 2013). The study of lifestyle is often confined to a single dimension, unconcerned with how multivariate differences in lifestyle between widowed and non-widowed older adults affect their SWB. By analyzing three lifestyle dimensions (recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends) in widowed and non-widowed older adults, we were able to examine of the impact of widowhood on the SWB of older people, with an emphasis on the mediating effects of these three dimensions. As Fig. 1 suggests, recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends are included in the relation of widowhood and SWB.
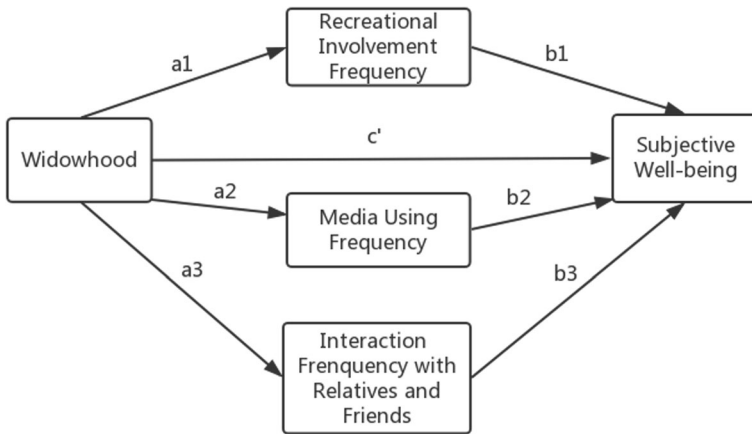
Fig. 1 Mediation path analysis for three dimensions of lifestyle

Methods

Data

The data analyzed for this research was obtained from the 2013 Chinese General Social Survey (CGSS). Targeted at urban and rural families in China, the CGSS project assessed various parameters such as health, migration, lifestyle, and social attitudes by surveying a total of 480 villages/neighborhoods across China, twenty-five families in each village/neighborhood, and one person randomly in each family. The total sample size was approximately 12,000. The ages of the sampled individuals were 17 to 97 years old. The sample size of people aged 60 and above was 3175. As this article focuses on the SWB of older adults, outliers and data with missing values have been deleted. The final sample size was 2855 individuals.

Variables

Dependent Variable

Subjective well-being (SWB) was the dependent variable. The question provided was: "Do you think you live a happy life?" The following were response options: 1 = very unhappy, 2 = rather unhappy, 3 = not sure, 4 = relatively happy, and 5 = very happy. As in Sun et al. (2016), we use the question to measure SWB.

Independent Variable

Widowed or not was the independent variable. The question provided was: "What is your marital status?" The following were response options: 1 = single, 2 = cohabiting, 3 = first marriage with a spouse; 4 = remarried with a spouse, 5 = separated but not divorced, 6 = divorced, and 7 = widowed. Participants who responded "single," "co-habiting," "separated but not divorced," and "divorced" were removed from the sample as they were neither married nor widowed. Three groups, "first marriage with a

spouse," "remarried with a spouse," and "widowed" were used in these analyses. The responses "first marriage with a spouse" and "remarried with a spouse" were categorized as "non-widowed".

Mediating Variables

We included three lifestyle dimensions: recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends. For recreational involvement frequency, the corresponding question was: "How often were you involved in the following activities during leisure times last year?" The activities included: watching TV or videos, going to the cinema, shopping, reading books/newspapers/ magazines, attending cultural activities, meeting relatives not living together, gathering with friends, listening to music at home, taking part in physical exercise, watching live sports, doing handwork, and surfing the internet. The frequency answers for each question were: 1 = never, 2 = several times a year or less, 3 = several times a month, 4 = several times a week, and 5 = every day. By summing up the values for each activity, we obtained the variable and defined it as "recreational involvement frequency," a continuous variable with a minimum value of 12 and a maximum value of 50.

For media use frequency, the corresponding question in the questionnaire was: "How often did you use the following media last year?" The options included: newspapers, magazines, radio, television, the internet, and cell phones. The frequency answers for each option were: 1 = never, 2 = seldom, 3 = sometimes, 4 = regular, and 5 = very frequent. Again, we summed the values for each media and defined it as "media use frequency," a continuous variable with a minimum value of 6 and a maximum of 27.

For interaction frequency with relatives and friends, the relevant questions were: "what is the frequency of your social entertainment with your neighbors?" and "what is the frequency of social entertainment with other friends?" The options for each answer were: 1 = never, 2 = once a year or less, 3 = several times a year, 4 = once a month, 5 = several times a month, and 6 = once or twice a week, and 7 = almost daily). This variable is a continuous variable with a minimum value of 2 and a maximum of 14.

Control Variables

The control variables include gender, age, urban or rural residency, social economic status, educational attainment, self-rated health status, employment status, number of children, and living arrangements. Table 1 details the definition and measurement of variables.

Analytic Strategy

To estimate the relationship between widowhood, lifestyle factors, and the SWB of older adults, OLM was conducted on the data. As subsequent mediation effect tests required the dependent variable to operate as a continuous variable, this article continues to use the OLS model to assess the relationship between widowhood and the SWB of the older adults. The main purpose is to compare the statistical results of OLM and OLS regression, to demonstrate that both models are suitable for this analysis. To

Table 1 Definition and measurement of variables

Variables	Definition and measurement
Subjective well-being	1 = very unhappy; 2 = rather unhappy; 3 = not sure; 4 = relatively happy; 5 = very happy
Widowed or not	0 = non-widowed; 1 = widowed
Gender	0 = Female; 1 = Male
Age	Age of the respondent
Educational attainment	0 = below Primary School; 1 = Primary School; 2 = Middle School; 3 = High School or above
Urban/Rural resident	0 = rural resident; 1 = urban resident
Employment status	0 = out of work now and before; 1 = in work now or farming
Cohabitants No.	How many people are currently living in your home (including yourself)?
Children No.	How many children do you have?
Self-rated health status	0 = very unhealthy; 1 = rather unhealthy; 2 = average; 3 = relatively healthy; 4 = very healthy
Social economic status	0 = higher; 1 = average; 2 = lower
Recreational involvement frequency	12 to 50, the larger, the more frequent
Media use frequency	6 to 27, the larger, the more frequent
Interaction frequency with Relatives and friends	2 to 14, the larger, the more frequent

test the robustness of the above models and the net effect of widowhood on the SWB of older people, the propensity score matching method (radius matching method and kernel density matching method) was also adopted.

To obtain the propensity score, we conducted one logit model in which widowed or not was a dependent variable and age, gender, education level, residency type, employment status, and social economic status were independent variables; the probability of widowhood status predicted from the logit model was the propensity score. The method of radius matching sets the radius value at 0.1 in order to find individuals that can be matched within this range. The basic principle of kernel matching is weighting and averaging the values of the dependent variables of the control group, and the weight is the value of the core equation. For this matching, the given core equation $K(u)$ and the broadband parameter h need be given. If the sample is normally distributed, the core equation is as follows:

$$K(u) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{u^2}{2}\right).$$

Lastly, we conducted a mediation analysis using principles from the Baron and Kenny mediation procedure (Baron and Kenny 1986) and the bias-corrected percentile bootstrap CI method (Preacher and Hayes 2004) in SPSS 22.0.

Results

Descriptive Results

Table 2 presents descriptive statistics. The average SWB of the widowed older adults was 3.73 and of non-widowed older adults was 3.82, indicating that the widowed older people have a lower average SWB. The recreational involvement frequency for the widowed was 21.74, lower than 23.49 for the non-widowed; the media use frequency for the widowed was 10.94, less than 12.21 for the non-widowed; and there was no observed difference in the interaction frequency with relatives and friends between

Table 2 Descriptive statistics of variables

Variables	Percentage/mean value (standard deviation)(%)		
	Full sample $N=2855$	Widowed sample $N=727$	Married sample $N=2128$
Subjective well-being	3.80	3.73	3.82
Gender			
Male	50.89	32.87	57.05
Female	49.11	67.13	42.95
Age (years)	69.05	72.93	67.73
Educational attainment			
Below primary school	34.05	50.21	28.52
Primary school	31.31	28.75	32.19
Middle school or above	34.64	21.05	39.29
Urban/rural resident			
Urban	54.19	54.20	54.18
Rural	45.81	45.80	45.82
Employment status			
In work	32.43	23.93	35.34
Out of work	67.57	76.07	64.66
Cohabitants No.	2.72	2.17	2.90
Children No.	2.82	3.24	2.68
Social economic status			
Higher	6.44	5.78	6.67
Average	56.92	51.86	58.65
Lower	36.64	42.37	34.68
Recreational involvement frequency	23.04	21.74	23.49
Media use frequency	11.89	10.94	12.21
Interaction frequency with relatives and friends	7.72	7.69	7.73
Self-rated health status			
Unhealthy	30.86	35.63	29.23
Average	26.87	26.27	27.07
Healthy	42.28	38.10	43.70

Table 3 Regression results for subjective well-being of older people

Variables	Ordered logistic regression		OLS regression	
	Model 1	Model 2	Model 3	Model 4
Widowed or not	−0.077*	−0.065	−0.217*	−0.189*
	(−2.02)	(−1.73)	(−2.33)	(−2.02)
Age	0.007**	0.008**	0.019**	0.022***
	(2.71)	(3.01)	(3.07)	(3.41)
Gender	−0.113***	−0.103**	−0.269***	−0.244**
	(−3.44)	(−3.12)	(−3.34)	(−3.00)
Urban/rural resident	0.034	−0.031	0.090	−0.095
	(0.94)	(−0.83)	(1.02)	(−1.03)
Employment status	0.031	0.047	0.025	0.075
	(0.82)	(1.24)	(0.27)	(0.82)
Social economic status				
Higher(ref)				
Average	−0.145*	−0.119	−0.531***	−0.465**
	(−2.29)	(−1.90)	(−3.42)	(−2.97)
Lower	−0.548***	−0.500***	−1.456***	−1.352***
	(−8.27)	(−7.56)	(−8.82)	(−8.12)
Educational attainment				
Below primary school(ref)				
Primary school	0.114**	0.082*	0.254**	0.168
	(2.90)	(2.06)	(2.64)	(1.72)
Middle schoolor above	0.064	−0.015	0.118	−0.095
	(1.46)	(−0.31)	(1.10)	(−0.82)
Cohabitants no.	0.026*	0.024*	0.055*	0.052*
	(2.47)	(2.44)	(2.18)	(2.07)
Self-related health status				
Unhealthy(ref)				
Average	0.118**	0.091*	0.219*	0.149
	(2.89)	(2.25)	(2.22)	(1.50)
Healthy	0.347***	0.313***	0.838***	0.759***
	(9.31)	(8.41)	(8.98)	(8.08)
Children no.	0.035***	0.039***	0.085**	0.098***
	(2.99)	(3.35)	(2.96)	(3.40)
Recreational involvement frequency		0.024***		0.072***
		(6.52)		(7.66)
Media use frequency		0.007		−0.026
		(1.17)		(−1.72)
Interaction frequency with relatives and friends		0.006		0.007
		(1.30)		(0.70)
Adjusted R^2	5.36%	6.45%	11.80%	13.49%

t statistics in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

widowed older people and non-widowed ones. The findings suggest that there are some lifestyle differences between widowed and non-widowed older adults in two dimensions, recreational involvement frequency, and media use frequency.

Regression Results

First, we applied ordered logistic regression to determine the correlation between widowhood and SWB. Model 1 in Table 3 includes widowhood and control variables. The results show that widowhood was significantly negatively correlated with the SWB of older adults. In Model 2, we added recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends, which was based on Model 1. The result of Model 2 is that widowhood was not associated with the SWB of older adults.

Second, we applied the OLS regression to approach the relationship between widowhood and SWB. Model 3 in Table 3 includes widowhood and control variables. The results show that widowhood was significantly negatively correlated with the SWB of older adults. In Model 4, we added recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends, which was based on Model 3. The result was that widowhood was significantly negatively correlated with the SWB of older adults. The results of the two methods suggest that there is a negative association between widowhood and SWB, and a negative association between recreational involvement frequency and SWB of older people.

Propensity Score Matching Analysis

In order to verify the robustness of the four models above, we adopted the propensity score matching method (radius matching method and kernel-density matching method) to verify the impact of widowhood on the SWB of older adults. Both matching methods passed the balance test. Table 4 presents the propensity score matching results of the SWB of older adults. As can be seen, widowhood was associated with a significant negative relationship with the SWB of older adults. The results were similar to the four regression results in Table 3.

Mediation Effect Analysis

The above analyses reveal that widowhood was associated with significant reductions in the SWB of older people. Below, we will further explore the mediation effects of lifestyle for the causality between widowhood and subjective well-being, as presented

Table 4 Propensity score matching results of the subjective well-being of older people

Matching method	Widowed elderly	Married elderly	ATT	Standard error	T
Radius matching method	626	1944	−0.114***	0.044	−2.59
Kernel density matching method	626	1944	−0.104**	0.052	−2.01

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5 Results of mediation effect analysis

Effect X——Y	EFFECT	SE	LLCI	ULCI
Direct effect	−0.065	0.038	−0.140	−0.008
Indirect effect	−0.012	0.006	−0.024	−0.001
Recreational involvement frequency	−0.016	0.005	−0.029	−0.006
Media use frequency	0.003	0.003	−0.001	0.010
Interaction frequency with relatives and friends	0.001	0.001	−0.001	0.005

in Table 5. After adding the three mediating variables, the direct effect of widowhood on the SWB of older adults remains significant (−0.140, −0.008) and the effect size is −0.065. The total mediated effect of the three mediating variables is −0.012, which is statistically significant (−0.024, −0.001). Among the three mediating variables, the recreational involvement frequency (−0.029, −0.006) was a significant mediator, (−0.016), whereas the media use frequency (−0.001, 0.010) and the interaction frequency with relatives and friends (−0.001, 0.005) are not significant.

As Fig. 2 suggests, when recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends are all included in the mediation effect model, widowhood-recreational involvement frequency ($\beta = -0.644$, $P = 0.005$) and recreational involvement frequency-SWB (0.024, $P = 0.000$) correlations are significant. The mediation analysis detected one mediation effect: widowhood-recreational involvement frequency-SWB. Widowhood resulted in lower recreational involvement frequency in older adults, thus lowering their SWB.
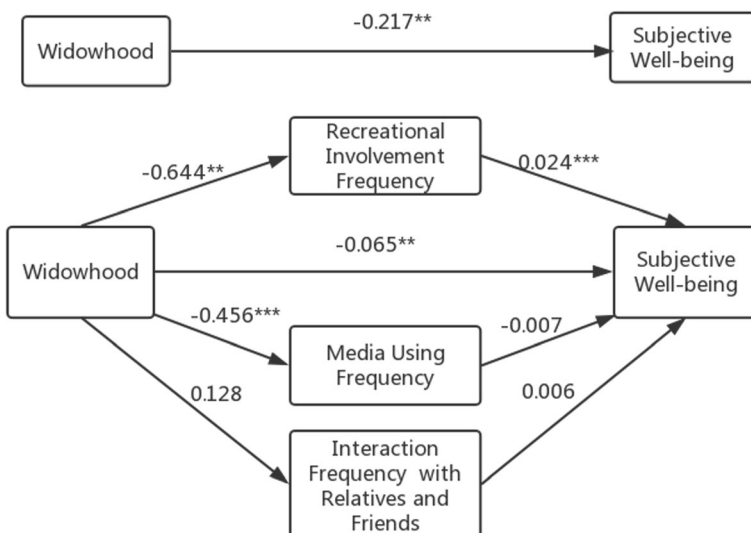
Fig. 2 Mediation effect paths for widowhood on the SWB of older people. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Discussion and Conclusions

Marital status has previously been observed to influence individual well-being, and widowhood may reduce SWB. By comparing the differences between widowed and non-widowed older adults in three lifestyle dimensions (recreational involvement frequency, media use frequency, and interaction frequency with relatives and friends), this study examined the associations between widowhood and the SWB of older people and the mediation effects of lifestyle between widowhood and the SWB.

The recreational involvement frequency and media use frequency of widowed older adults were significantly lower than those of the non-widowed participants. This suggests that compared with older adults with a spouse, widowed older adults have a lower recreational involvement frequency. Additionally, these participants used media such as newspapers, magazines, radio, television and the internet less often. The lifestyles of widowed older adults appear to be distinct from those of the non-widowed older adults. Older adults may find it difficult to adapt to the many changes brought on by widowhood. For instance, social interaction associated with their spouses decreases and the support from their spouses is lost. As a result, they become vulnerable and isolated, refusing to seek social support beyond marriage, to participate in recreational activities, to take an interest in the world outside, or to be active in communicating with relatives and friends. On the other hand, these lifestyle differences may arise from passive lifestyle adjustments made after losing their spouses (Stahl and Schulz 2014). In China, the traditionally gendered society requires that both men and women assume certain family responsibilities to maximize family benefits. If a spouse passes away, the original division of labor in the family breaks down, implying that the widowed person needs to take on some kind of family responsibilities originally assumed by his/her spouse and to take over family affairs on his/her own. This leaves older adults with no choice but to adjust their former social roles and change their original lifestyles to accommodate their widowhood.

Widowed older adults had a lower SWB than older adults with spouses. Widowhood may lead to a decrease in the SWB of older people, a finding consistent with Utz et al. (2002) and Sun et al. (2016). Currently in China, especially in rural areas, the social security system has not been established and the overall health of older people is poor. Hence, widowhood may have a serious impact on the quality of life for older adults. From the perspective of social support, being widowed means losing economic security for many older women as the breadwinners are usually men, and the loss of daily care for many older men as women traditionally take care of their spouse. A lack of care, company, and reliance in their twilight years may make older people lonely and therefore cause a decrease in their SWB. From the perspective of life cycles, older people are in a period of physiological decline and their functional capacity may be deteriorating. Correspondingly, their mental defenses and mental adaptability are also diminishing. Once a spouse dies, the widowed person may find it hard to re-establish the psychological balance and the tendency toward depression will increase or existing physical illnesses will be aggravated. All these factors will necessarily result in a lower SWB for widowed older adults.

The results of this study illustrate that the SWB of older people may be reduced by widowhood, via the mediation of recreational involvement. Recreational involvement frequency is a crucial mediator between widowhood and the SWB of older adults.

Lifestyle changes of widowed older adults may be due to one's spouse being the source of motivation to stay engaged, as some older people may be more comfortable doing particular activities with their spouse rather than alone. Due to the advantages of socialization, leisure, and recreational activities, older people are often able to maintain healthy social emotions and maintain or improve their quality of life (Li et al. 2016). These activities enhance the chances of older adults engaging in social interaction and enable them to obtain emotional support and ease their loneliness after spousal loss, facilitating a rise in their SWB.

Binding two people together as an economic entity, marriage meets the individual needs of survival, offers more social resources to individuals, and allows couples to cooperatively deal with various disasters and stressful incidents. For older people, the social resources provided by the spouse grow increasingly important (Hagedoorn et al. 2006). Widowhood not only means the dissolution of marriage, but it means that some social resources and social support for individuals are now out of reach. Considering that the social security level of older people is generally low across China and that children's support for older people is gradually declining, widowhood will undoubtedly increase the burden of living and survival stress on older adults and undermine their physical and mental health and decrease their SWB. If widowed older adults can confront their widowhood with a positive attitude, make full use of leisure time to participate in recreational activities, and use media more often to obtain outside information, the maladjustment associated with widowhood will be alleviated and their SWB will rise. Relatives and friends should also establish closer contact with widowed older adults to provide them with more emotional support and tools in order to help them during the adjustment period after being widowed, enhance their SWB, and improve their quality of life.

This study provides insights into the relationship between widowhood and SWB, but several limitations must be noted in the interpretation of these results. First, this paper employed cross-sectional data, which limits the capacity to make causal assumptions. Second, the definition of SWB remains complex, and both life satisfaction and happiness questions can be used to measure SWB. They might represent different aspects of SWB, and it would be interesting to investigate the relationship between these two types of SWB and widowhood in China. Regarding the limitations of the data, we only used the happiness question from the CGSS to measure SWB; differences in the design of the SWB question might influence the results and create difficulties in drawing comparisons with other studies. The adjusted R-squared values for SWB relationships were quite low. Also, due to the limitations of the data, it was impossible to acquire the lifestyle data of older adults before widowhood, so it has not been possible for us to contrast the lifestyles of older people before and after widowhood. Finally, cross-sectional survey data cannot cover all the dimensions of lifestyle and accordingly, this study only includes three lifestyle aspects. In future research, longitudinal data with more lifestyle dimensions may more thoroughly elucidate these relationships.

To conclude, our findings support a negative association between widowhood and SWB. Our results show that widowhood lowers the subjective well-being of older adults and that recreational involvement frequency mediates effects between them. Based on these findings, some practical implications for the enhancement of widows' or widowers' SWB can be offered; specifically, that widowed older adults may improve

their SWB by changing their lifestyles, especially with regard to recreational involvement and media use. These findings have important implications, particularly that older adults can improve their experience of widowhood through lifestyle interventions. From a practical perspective, this suggests that interventions that can be facilitated at an individual, community, or population level that fosters greater engagement in recreational activities and may be able to offset some of the negative implications of widowhood. With the number of individuals experiencing widowhood expected to increase in the future, using strategies in which modifiable lifestyle behaviors can be used to foster better outcomes will become increasingly important. These results suggest one pathway to improving the lives of those experiencing widowhood.

Compliance with Ethical Standards

Competing Interests The authors declare that they have no competing interest.

Ethical Statement CGSS (the Chinese General Social Survey), as a household survey, involved no patients in the design or development of the research question and outcome measures. No patients were involved in developing the hypothesis and plans for design of this study either. The results would not be disseminated to study participants or any other individuals or communities.

Consent for Publication Not applicable.

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