Cross-sectional and longitudinal associations between quality of first marriage and subjective health assessment in older Chinese residents

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Research Article

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Abstract

Background: First marriage was vital for a common person in all-life, and there were concerns that marital quality had relationship with self-reported health and quality of life (SRH and SRQoL), health change, and sleep quality. This study aimed to examine longitudinal associations between subjective health assessment and quality of first marriage to characterize the stability and directionality of the trajectory of marriage- health over time.

Methods: Data were from the Chinese Longitudinal Healthy Longevity Survey. Chinese elders completed surveys across 3 waves (2008/2009, 2011/2012, and 2014). Using autoregressive cross-lagged models, bidirectional relationships between SRH, SRQoL, health change, sleep quality, and quality of first marriage over time were examined.

Results: Cross-sectional analysis confirmed the significant associations between SRH, SRQoL, health change, sleep quality, and quality of first marriage. Autoregressive linear models of SRH, SRQoL, health change, sleep quality, and quality of first marriage were confirmed. Cross-lagged relationship between SRQoL and SRH, between SRQoL and sleep quality, between SRQoL and health change, between SRH and sleep quality, between quality of first marriage and SRQoL, and between sleep quality and health change were confirmed.

Conclusions: Subjective health assessment was associated with future subjective health assessment across 3 longitudinal waves. Quality of first marriage might be influenced by SRQoL among older Chinese. Future research needs to examine influencing psychological mechanism of the cross-lagged relationships.

Background

Previous studies have established that high marital quality was related to better psychological and physical health. For example, a review suggested that unhappy marriages were associated with morbidity and mortality [1]. A recent meta-analysis confirmed associations between marital quality and physical health outcomes [2]. Further, a study demonstrated that the well-established association between marital adjustment and psychological distress found in European-American countries and Japan [3]. In addition, an investigation reported positive marital quality of both spouses contributes to health protection for middle-aged and older spouses [4]. Several prior studies reported mental health influenced marital quality. Longitudinally, psychopathic traits predicted divorce [5]. A study suggested the importance of accounting for both marital status and marital quality when examining older individuals' mortality risk [6]. A review suggested that marital functioning was consequential for health [7]. A longitudinal study concluded marital dissolution, alone and together with marital quality, was associated with worsened mental and physical health [8]. A meta-analysis reported greater marital quality was related to better health and lower cardiovascular reactivity during marital conflict [9]. Thus, interactions between marital process and health consequences were the central relationship for most adults.

Relationship between marriage and health were often analyzed with longitudinal data. For example, longitudinal associations of marital quality and marital dissolution [10], longitudinal associations between depressive symptoms and marital processes [11], longitudinal associations between marital quality and sleep quality in older adulthood [12], and longitudinal associations between alcohol consumption and negative marital quality [13] were investigated. Several longitudinal studies observed bidirectional association between poor marital quality and depression [14], bidirectional association between marital problems and marital dissatisfaction [15], bidirectional associations between changes in insomnia and changes in marital quality [16], and bidirectional relationships between marital and sleep problems [17]. Another study suggested both marital strain and marital strength have potent effects on biology and health [18]. Using longitudinal data, previous studies have examined how narcissism [19], change in cognitive limitations [20], workloads [21], and dyadic coping [22] predicted the trajectory of marital quality over time. Regarding the link between marital quality and health, a study with a national longitudinal survey show that marital strain accelerates the typical decline in SRH at older ages [23].

Several studies empirically evaluated and validated the effectiveness of intervention for couples. Regarding marital functioning, there were some significant partner effects [24]. A supportive spouse might buffer stress-related autonomic processes linking low socioeconomic status to risk for cardiovascular disease [25]. For example, providing support to couples might improve marital functioning and an opportunity for relational growth during end-stage cancer [26]. On the basis of marital health model, marriage checkup could promote marital health by marital interventions [27]. A cross-disease review evaluated couple-oriented interventions for chronic physical illness [28]. Additionally, a current meta-analysis suggested a relationship checkup to improve couples' marital functioning up to six-month follow-up [29]. Likewise, couple-based interventions could be feasible, acceptable, and efficient [30] and be initiated early during pregnancy [31]. But, effective interventions could not possibly operate well in China. Before liberation and on the early Days of New China, early marriage was common in Chinese society and might have an important role on late-life marital instability. Furthermore, a current study reported that the majority of the health behaviors of elderly individuals in China were not healthy [32].

To better understand the stability and directionality of these associations over time, we used a autoregressive cross-lagged models to examine the direct and reciprocal relationships between marital and health variables using a longitudinal survey. For example, we can simultaneously model autoregressive effects (ie, relationships between early a quality of first marriage predicting the same quality of first marriage at a future wave; or relationships between early a subjective health assessment predicting the same subjective health assessment variable at a future wave) and cross-lagged effects (ie, indirect effects of earlier marital variables on future subjective health assessment variables, or indirect effects of earlier subjective health assessment variables on future quality of first marriage variables). If the cross-lagged relationship was unidirectional over multiple waves such that SRH and SRQoL predicts quality of first marriage but not vice versa, this would further support the notion that quality of first marriage were risk factors for subjective health assessment.

Thus, this study first depicted the sample characteristics. Second, this study explored associations between quality of first marriage and self-reported subjective health assessment in 2008/2009 wave, 2011/2012 wave, and 2014 wave. Third, this study explored longitudinal mediation effects between quality of first marriage and subjective health assessment. In the end, the key statistical outcomes were analyzed.

Method

Sample

Data for this study were from the Chinese Longitudinal Healthy Longevity Survey (<http://opendata.pku.edu.cn/>) across 3 waves (2008/2009, 2011/2012, and 2014). All experimental protocols were approved by the ethics committee of Peking University. The survey data contained all the information collected in the 2008/2009 wave, 2011/2012 wave, and 2014 wave survey for the respondents who were interviewed in 2008/2009 wave, re-interviewed in 2011/2012 wave, interviewed in 2011/2012 wave, re-interviewed in 2014 wave, and interviewed in 2014 wave.

Main variables

The socioeconomic variables included surveyed age (2008/2009, 2011/2012, and 2014), gender (male and female), and number of people living with. quality of first marriage was rated by the response options 'good' (=1), 'so so' (=2), and 'bad' (=3). In the questionnaire, subjective health assessment was referred by self-reported health (SRH), self-reported quality of life (SRQoL), health change, and sleep quality. SRH and SRQoL were denoted by with a 5-point Likert scale responses ranging from 'very good' (=1) to 'very bad' (=5). Health change was reflected by the question: "Do you feel any change of your health since last year?" with the response options ranging from 'much better' (=1) to 'much worse' (=5). A single question was used to measure sleep quality among participants. The item, 'How about the quality of your sleep?' was rated from 'very good' (=1) to 'very bad' (=5).

Data Analysis

Data analysis was conducted in three steps. First, the longitudinal characteristics of the sample were depicted with chi-square test in 2008/2009 wave, 2011/2012 wave, and 2014 wave.

Second, In order to explore the association between socioeconomic factors, SRH, SRQoL, and quality of first marriage in 2008/2009 wave, 2011/2012 wave, and 2014 wave with multiple logistic regressions, quality of first marriage were recoded as good (=0) and poor (so so, bad =1). Simultaneously, age (less than 79=0, more than 80 =1), gender (female=0, male=1), ethnicity (ethnic minority=0, Han majority=1), and number of people living with (less than 2=0, 2 and above=1) were categorized.

Third, in order to explore longitudinal associations of quality of first marriage with the four health variables, quality of first marriage with SRH, SRQoL, health change, sleep quality was still reflected by original categorical options. According to combination formula, quality of first marriage could be

combined with single health variable, double variables, three variables, and four variables. Thus, fifteen models could be obtained. Path models were used to simultaneously estimate the following: (1) the autoregressive direct effects within quality of first marriage trajectories and SRH and SRQoL in 2008/2009 wave, 2011/2012 wave, and 2014 wave) and (2) the reciprocal predictive pathways between quality of first marriage and the four health variables.

Model fit for autoregressive cross-lagged models was assessed in similar ways as other structural equation models with root mean square of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis index (TLI), and standardized root mean square residual (SRMR), and coefficient of determination (CD). Goodness-of-fit indices of path analysis included $p > \chi^2$, RMSEA (<0.10 , acceptable fit; <0.05 , good fit), CFI (>0.95 , good fit), TLI (>0.95 , good fit), SRMR (<0.05 , good fit), CD (>0.95 , good fit).

Analyses were run by using Stata (version 14.0).

Results

Participants

In table 1, participants' ages in 2008/2009 wave, 2011/2012 wave, and 2014 wave were more than 60 years old. The majority of the sample was females. The average age at the first marriage was 22 years old with the minimum 7 years old. The average age at the first dissolution was 66 years old. The average number of people living with was 3. Mean male age at the first marriage in 2008/2009 wave, 2011/2012 wave, and 2014 wave was 23.19 (± 0.11), 23.20 (± 0.11), 23.40 (± 0.12), respectively. Mean female age at the first marriage in 2008/2009 wave, 2011/2012 wave, and 2014 wave were 19.80 (± 0.07), 19.79 (± 0.07), and 20.02 (± 0.09). Mean ages at the first marriage of both genders were higher than legal ages of in 1950 marriage law (male: 20, female: 18) and roughly equal to legal ages of in 1980 marriage law (male: 22, female: 20). This was in line with average age difference of first-marriage couples in the 2000s that the "older husband and younger wife" was the main mode of marriage age matching [33]. Regarding first marriage pattern, China remained as a universal-marriage society despite a steady rise of the age at first marriage [34]. Obviously, there were significant gender differences in age group, number of people living with, SRH, health change, quality of first marriage, and sleep quality in 2008/2009 wave, 2011/2012 wave, and 2014 wave. Also, there were significant gender differences in SRQOL in 2008/2009 wave and 2011/2012 wave. But, there were no significant gender differences in ethnicity in 2008/2009 wave, 2011/2012 wave, and 2014 wave.

Table 1. Sample characteristics (%).

	2008/2009 wave			2011/2012 wave			2014 wave		
	Male	Female	chi2	Male	Female	chi2	Male	Female	chi2
Age group	N=5,245		53.43***	N=5,245		56.45***	N= 5,245		38.15***
Less than 80	27.51	26.12		23.60	21.51		18.91	17.27	
80 and above	19.10	27.26		23.01	31.88		27.70	36.11	
Ethnicity	N=5,245		1.74	N=5,245		1.74	N=5,245		1.74
Ethnic minority	2.67	3.53		2.67	3.53		2.67	3.53	
Han majority	43.95	49.86		43.95	49.86		43.95	49.86	
Number of people living with	N= 4,349		95.25***	N=4,342		97.19***	N=4,474		85.38***
Less than 2	23.94	17.96		22.92	17.60		23.29	18.62	
2 and above	24.49	33.62		24.60	34.89		24.16	33.93	
SRQoL	N= 5,088		13.20**	N= 5,104		9.97**	N= 4,796		0.89
Very good	7.47	6.70		9.38	9.42		9.72	10.15	
Good	20.97	24.33		19.06	23.39		22.44	24.46	
So so	16.00	18.28		16.01	17.30		13.99	15.24	
Bad	2.38	3.20		2.33	2.29		1.42	1.71	
Very bad	0.26	0.41		0.31	0.49		0.40	0.48	
SRH	N= 5,088		35.43***	N= 5,105		59.61***	N= 4,793		14.95***
Very good	7.51	6.47		6.52	5.25		4.94	4.42	
Good	19.58	20.54		17.47	18.00		16.13	17.15	
So so	14.68	17.59		17.32	19.71		19.65	20.68	
Bad	4.93	7.68		5.54	9.13		6.41	8.74	
Very bad	0.37	0.65		0.24	0.82		0.81	1.06	
Health change	N= 5,078		31.23***	N= 5,085		26.25***	N= 4,770		8.42*
Much better	1.08	1.28		1.06	1.59		1.11	1.19	
A little better	4.17	4.63		3.74	4.86		3.38	3.90	
No change	27.90	27.59		24.74	24.11		23.44	23.35	
A little worse	12.45	17.19		15.10	18.96		17.04	20.04	
Much worse	1.48	2.23		2.44	3.40		2.94	3.61	
1st marital quality	N= 5,180		31.14***	N= 4,558		25.69***	N= 4,563		20.74***
Good	39.19	42.76		39.29	43.22		39.54	43.77	
So so	5.60	9.52		5.46	9.28		5.35	8.79	
Bad	1.41	1.53		1.29	1.45		1.23	1.34	
Sleep quality	N= 5,236		85.06***	N= 5,235		91.64***	N= 5,099		61.42***
Very good	8.63	6.76		10.79	9.13		9.35	8.69	
Good	24.94	25.74		21.18	21.11		20.26	20.18	
So so	9.15	14.34		9.86	14.29		12.49	15.73	
Bad	3.69	5.92		4.28	8.12		4.12	7.63	
Very bad	0.23	0.59		0.48	0.76		0.51	1.04	

Note: ***, ** and * indicated 0.01, 0.05 and 0.10 significance level, respectively.

Cross-sectional associations

Table 2 showed associations between SRH, SRQoL, health change, sleep quality, and quality of first marriage. In 2008/2009 wave, age 80 and above (OR= 1.23, 95% CI: 1.04-1.45), male (OR= 0.69, 95% CI: 0.58-0.81), Han majority (OR= 0.50, 95% CI: 0.40-0.62), number of people living with 2 and above (OR= 1.17, 95% CI: 1.00-1.39), SRQOL (So so: OR= 1.41, 95% CI: 1.05-1.89; Bad: OR= 3.17, 95% CI: 2.10-4.77), health change (A little better: OR= 0.20, 95% CI: 0.13-0.30; No change: OR= 0.20, 95% CI: 0.14-0.28; A little worse: OR= 0.21, 95% CI: 0.15-0.31; Much worse: OR= 0.21, 95% CI: 0.12-0.35), and sleep quality (Good: OR= 1.25, 95% CI: 0.96-1.61; So so: OR= 1.46, 95% CI: 1.10-1.94) were significantly associated with quality of first marriage.

In 2011/2012 wave, age 80 and above (OR= 1.29, 95% CI: 1.08-1.54), male (OR= 0.63, 95% CI: 0.53-0.76), Han majority (OR= 0.58, 95% CI: 0.46-0.75), SRQoL (Good: OR= 1.46, 95% CI: 1.11-1.93; So so: OR= 1.79, 95% CI: 1.33-2.41 ; Bad: OR= 2.15, 95% CI: 1.32-3.52 ; Very bad: OR= 6.07, 95% CI: 2.73-13.49), SRH (Good: OR= 0.69, 95% CI: 0.51-0.94; So so: OR= 0.57, 95% CI: 0.41-0.79; Bad: OR= 0.63, 95% CI: 0.43-0.93; Very

bad: OR= 0.48, 95% CI: 0.20-1.15), health change (A little better: OR= 0.26, 95% CI: 0.16-0.40; No change: OR= 0.33, 95% CI: 0.24-0.46; A little worse: OR= 0.37, 95% CI: 0.26-0.53; Much worse: OR= 0.32, 95% CI: 0.19-0.52), and sleep quality (Very bad: OR= 1.82, 95% CI: 0.95-3.48) were significantly associated with quality of first marriage.

In 2014 wave, age 80 and above (OR= 1.30, 95% CI: 1.08-1.58), male (OR= 0.68, 95% CI: 0.57-0.82), Han majority (OR= 0.52, 95% CI: 0.41-0.66), number of people living with 2 and above (OR= 1.27, 95% CI: 1.05-1.53), SRQoL (Good: OR= 1.32, 95% CI: 1.00-1.74; So so: OR= 1.59, 95% CI: 1.18-2.14 ; Bad: OR= 3.53, 95% CI: 2.14-5.83 ; Very bad: OR= 3.25, 95% CI: 1.20-8.81), SRH (Very bad: OR= 1.80, 95% CI: 0.90-3.61), health change (A little better: OR= 0.31, 95% CI: 0.19-0.49; No change: OR= 0.26, 95% CI: 0.19-0.37; A little worse: OR= 0.26, 95% CI: 0.18-0.38; Much worse: OR= 0.16, 95% CI: 0.10-0.28), and sleep quality (Very bad: OR= 2.16, 95% CI: 1.11-4.21) were significantly associated with quality of first marriage.

Table 2. Associations between subjective health assessment and 1st marital quality, OR(95% CI).

	2008/2009 wave	2011/2012 wave	2014 wave
Age			
Less than 80	Reference	Reference	Reference
80 and above	1.23**(1.04-1.45)	1.29***(1.08-1.54)	1.30***(1.08-1.58)
Gender			
Female	Reference	Reference	Reference
Male	0.69***(0.58-0.81)	0.63***(0.53-0.76)	0.68***(0.57-0.82)
Ethnicity			
Ethnic minority	Reference	Reference	Reference
Han majority	0.50***(0.40-0.62)	0.58***(0.46-0.75)	0.52***(0.41-0.66)
Number of people living with			
Less than 2	Reference	Reference	Reference
2 and above	1.17*(1.00-1.39)	1.16(0.97-1.38)	1.27***(1.05-1.53)
SRQoL			
Very good	Reference	Reference	Reference
Good	1.03(0.78-1.38)	1.46***(1.11-1.93)	1.32***(1.00-1.74)
So so	1.41***(1.05-1.89)	1.79***(1.33-2.41)	1.59***(1.18-2.14)
Bad	3.17****(2.10-4.77)	2.15****(1.32-3.52)	3.53****(2.14-5.83)
Very bad	2.37(0.80-7.06)	6.07****(2.73-13.49)	3.25***(1.20-8.81)
SRH			
Very good	Reference	Reference	Reference
Good	1.26(0.92-1.72)	0.69***(0.51-0.94)	0.83(0.59-1.16)
So so	1.23(0.89-1.69)	0.57****(0.41-0.79)	0.84(0.59-1.18)
Bad	1.07(0.73-1.57)	0.63***(0.43-0.93)	0.77(0.51-1.18)
Very bad	1.42(0.61-3.28)	0.48(0.20-1.15)	1.80*(0.90-3.61)
Health change			
Much better	Reference	Reference	Reference
A little better	0.20****(0.13-0.30)	0.26****(0.16-0.40)	0.31****(0.19-0.49)
No change	0.20****(0.14-0.28)	0.33****(0.24-0.46)	0.26****(0.19-0.37)
A little worse	0.21****(0.15-0.31)	0.37****(0.26-0.53)	0.26****(0.18-0.38)
Much worse	0.21****(0.12-0.35)	0.32****(0.19-0.52)	0.16****(0.10-0.28)
Sleep quality			
Very good	Reference	Reference	Reference
Good	1.25*(0.96-1.61)	0.89(0.70-1.12)	0.89(0.69-1.14)
So so	1.46****(1.10-1.94)	1.03(0.79-1.35)	0.99(0.76-1.30)
Bad	1.29(0.91-1.84)	0.89(0.64-1.23)	0.91(0.65-1.29)
Very bad	1.36(0.52-3.57)	1.82*(0.95-3.48)	2.16***(1.11-4.21)
Number of obs	4,189	3,701	3,627

Note: ***, ** and * indicated 0.01, 0.05 and 0.10 significance level, respectively.

Longitudinal associations

Results in figures 1a-1o from the path models indicated significant autoregressive effects of quality of first marriage trajectories. Thus, quality of first marriage in 2008/2009 wave predicted quality of first marriage in 2011/2012 wave. In turn, quality of first marriage in 2011/2012 wave predicted quality of first marriage in 2014 wave. The same results of SRH, SRQoL, health change, and sleep quality could be found in models 1 to 15. CFA results on model fit for 15 models were presented in Table 3. Here, all 15 models were acceptable. There were significant cross-lagged relationship between SRQoL and SRH in models 5, 11, and 15 cross-lagged relationship between SRQoL and sleep quality in models 6 and 13, cross-lagged relationship between SRQoL and health change in model 7, cross-lagged relationship between SRH and sleep quality in models 8, 11, 14, and 15, cross-lagged relationship between quality of first marriage and SRQoL in model 13, and cross-lagged relationship between sleep quality and health change in model 13, respectively. There were significant correlations among quality of first marriage, SRH, SRQoL, health change, and sleep quality in 2008/2009 wave.

Table 3. Model fit of 15 path analyses.

Models	p> chi2	RMSEA(90% CI)	CFI	TLI	SRMR	CD	Assessment
1	0.000	0.032 (0.021, 0.044)	0.999	0.997	0.015	0.967	Good
2	0.000	0.060 (0.050, 0.070)	0.996	0.991	0.025	0.971	Acceptable
3	0.000	0.054 (0.044, 0.065)	0.997	0.992	0.024	0.968	Acceptable
4	0.000	0.042 (0.032, 0.054)	0.998	0.995	0.019	0.968	Good
5	0.000	0.152 (0.146, 0.158)	0.924	0.869	0.088	0.969	Unacceptable
6	0.000	0.082 (0.076, 0.088)	0.977	0.960	0.051	0.970	Acceptable
7	0.000	0.084 (0.078, 0.090)	0.975	0.956	0.050	0.968	Acceptable
8	0.000	0.106 (0.100, 0.112)	0.962	0.934	0.064	0.971	Unacceptable
9	0.000	0.140 (0.135, 0.147)	0.933	0.884	0.080	0.968	Unacceptable
10	0.000	0.067 (0.061, 0.073)	0.984	0.973	0.039	0.969	Acceptable
11	0.000	0.128 (0.123, 0.132)	0.895	0.843	0.093	0.972	Unacceptable
12	0.000	0.140 (0.136, 0.144)	0.867	0.810	0.104	0.969	Unacceptable
13	0.000	0.084 (0.079, 0.088)	0.951	0.926	0.062	0.970	Acceptable
14	0.000	0.120 (0.116, 0.124)	0.904	0.856	0.085	0.971	Unacceptable
15	0.000	0.122 (0.119, 0.125)	0.845	0.787	0.100	0.972	Unacceptable

Discussion

This study explored reciprocal relationships between subjective health assessment and quality of first marriage among an elder sample of couples in autoregressive cross-lagged models using 3 waves of matched longitudinal data. In the logistic regression, significant associations between SRH, SRQoL, health change, sleep quality, and quality of first marriage were documented. In the structural equation models, this study did find significant bidirectional associations between quality of first marriage and SRQoL between 2011/2012 wave and 2014 wave. Likewise, the reciprocal relationships between SRQoL and SRH, between SRQoL and sleep quality, between SRQoL and health change, between SRH and sleep quality were reported.

Explicably, the marriage-health relationship could not be supported successfully in this study. First, Chinese marriage process was different from that in western countries. A discrete-time event history analysis indicated that there was nonlinear relationship between age at first marriage and marital stability in a China's settings [35]. Another cause may be cohort differences in the relative impact of marital dissolution on physical health [36]. Second, marital trajectories have specific marital quality. The trajectory of marital quality over the life course had three periods of decline, stagnation, and decline in

Iran [37]. The third explanation might come from spousal interactions. A study supported gender differences in the genetic and environmental influences on different aspects of marital quality in the United States [38]. Regarding associations between marital quality and negative experienced well-being in later life, marital appraisals played a complex role in shaping negative emotions among older adults [39]. There might be marital dynamics of gender difference in well-being in later life. For example, the association between husband's marital quality and life satisfaction might be influenced by marital quality of his wife [40].

The results that marital and psychological functioning could not predict each other could be explained on the basis of the previous studies. Subjective assessment was not the biological and clinical outcomes. Part of the participants was married in adolescence. Thus, age at first marriage might be related to the risk of developing cardiovascular diseases and cancer in later life [41]. Regarding married men, changes in longitudinal marital relationship quality appears associated with associations with a range of CVD risk factors [42]. Psychologically, variations in the marital quality might affect cardiovascular health [43, 44]. Empirically, marital quality was related to metabolic syndrome through its relationship to depressive symptoms for men and women [45].

Limitations

Due to statistical failure, this study did not reflect the spousal interactions in the longitudinal associations. For example, a study uses data from the 1992 Health and Retirement Study show that women reported lower marital happiness, marital interaction, and marital power than do men in later life [46]. From a life course perspective, a study showed that the strains of marital dissolution undermine the self-assessed health of men but not women [47]. Without psychological data, this study did not reflect the psychological processes in the longitudinal associations. Another study reported integrating psychological processes and physical health into change in marital quality, model of marriage-health links were constructed [48].

Conclusion

The present study confirmed cross-sectional associations between SRH, SRQoL, health change, sleep quality, and quality of first marriage among older Chinese adults. Autoregressive relationships among SRH, SRQoL, health change, sleep quality, and quality of first marriage were also confirmed. But, the most cross-lagged relationships were not acceptable in China's settings. Possibly, the psychological mechanisms of the classic relationships need be analyzed further.

Abbreviations

SRH= self-reported health

SRQoL = self-reported quality of life

RMSEA= root mean square of approximation

CFI= comparative fit index

TLI= Tucker–Lewis index

SRMR= standardized root mean square residual

CD= coefficient of determination

Declarations

Ethics approval and consent to participate

All methods were carried out in accordance with relevant guidelines and regulations. Informed consent was obtained from all subjects.

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Consent for publication (for human subjects)

Not applicable.

Availability of data and material

The datasets analysed during the current study are available in the <http://opendata.pku.edu.cn/>.

Competing Interests

The authors declared no potential conflict of interest with respect to the research, authorship and/or publication of this article.

Authors' contributions

MG designed the study, performed the descriptive and cross-sectional analysis, and completed the original version. HG conducted the statistical analysis of the longitudinal associations.

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Figures

Figure 1

Autoregressive cross-lagged models on the relationships between marriage and health in older Chinese residents. Values represent path estimates and standardized errors. Significant paths are denoted in a solid line (***, <0.01; **, <0.05; and *, <0.10) and insignificant paths are denoted in a dashed line.