Article

The Reciprocal Relationship between Instrumental Support from Children and Self-Rated Health among Older Adults over Time in Rural China

Weiyu Mao, PhD[1] ⓘ, Merril Silverstein, PhD[2], John J. Prindle, PhD[3], and Iris Chi, DSW[3]

Abstract

Objective: To investigate the dynamic interplay between instrumental support from children and self-rated health (SRH) among older adults over time in rural China. **Methods:** Data came from a regional representative, longitudinal study *The Well-Being of Older People in Anhui Province* collected in 2001, 2003, 2006, 2009, and 2012. At baseline, 1636 respondents reported having at least one child. Bivariate latent change score modeling was conducted, and sequential model comparison was used to assess the directionality of the reciprocal association. **Results:** Older adults who received higher levels of help with household chores from children tended to experience improvement in subsequent SRH, irrespective of gender. There is no evidence to support the influence of SRH on subsequent changes in instrumental support. **Discussion:** This study sheds light on the sequence of changes between support and health processes using population-based data within a specific sociocultural context.

Keywords

bivariate latent change score modeling, intergenerational support, older Chinese adults, perception of health, sequence of change

Introduction

Self-rated health (SRH) assessed by older adults has been consistently shown to be a robust indicator of objective health and predictor of future health outcomes, including functional ability, health service utilization, morbidity, and mortality in various populations and cultures (Idler & Cartwright, 2018). The importance of social support in maintaining health in later life has also been widely recognized (Umberson & Montez, 2010). On the other hand, the health of older adults could influence the composition of one's social network and the amount of support received (Pavela, 2015). However, little is known about the reciprocal nature of the relationship between social support and health among older adults over time (e.g., Ha et al., 2017). Resolving this question is important, as population aging has increased the number of older people with chronic conditions needing help and support from family members (Hornby-Turner et al., 2017; Shaw et al., 2007). Families are vital in providing instrumental support to aging parents, and the role of adult children in support provision has long been considered a resource in the aging process (Umberson et al., 2010). However, it is important to understand that intergenerational

support and SRH change over the course of later life (Craigs et al., 2014). How support and health processes are interrelated with each other as they unfold over time remains understudied in gerontological research (Mao et al., 2019).

Theories that address the association between support and health are developmental in nature and describe dynamic bidirectional processes that evolve over time. Consequently, there is a distinct benefit to applying dynamic modeling approaches to evaluate such theories (e.g., Ferrer & McArdle, 2010). Theories that explicate the relationship leading from social support to physical health and mental health are first discussed. Social causation is an important mechanism to consider in studying social processes resulting in health disparities (Kröger et al., 2015). It is generally

[1]University of Nevada, Reno, NV, USA
[2]Syracuse University, Syracuse, NY, USA
[3]University of Southern California, Los Angeles, CA, USA

Corresponding Author:
Weiyu Mao, School of Social Work, University of Nevada, Reno, 1664 N. Virginia Street, Ansari Business Building 523, MS 0090, Reno 89557-0090, NV, USA.
Email: weiyum@unr.edu

acknowledged that social support benefits health and mental health (Umberson & Montez, 2010) and low support tends to lead to poor health and mental health outcomes, findings consistent with a social causation mechanism (e.g., Almquist et al., 2016; Platt et al., 2016). Social support may operate to protect health and mental health by providing for practical needs, offering emotional comfort, reducing uncertainty/stress in life circumstances, and promoting immunological strengthening (Berkman et al., 2000).

Social breakdown theory offers an alternative prediction that support may lead to adverse physical health and mental health outcomes among older adults. Social support, and intergenerational support in particular, can be health damaging when it exacerbates vulnerabilities, undermines autonomy, reduces personal control, and causes distress in later life. The increasing dependency on support among vulnerable older adults may further reduce individual competence and erode self-sufficiency, leading to further debilitation (Bengtson et al., 2016; Silverstein et al., 1996).

The process by which physical health and mental health lead to greater or lesser social support is explicated by health selection and mobilization theories. Health selection is an important mechanism to consider in studying health disparities resulting in differences in social processes (Kröger et al., 2015). Health selection theory helps explicate why poor health may lead to low support. As applied to mental health, selection theory posits that individuals who suffer from psychological distress may withdraw from social interactions, resulting in low social support (e.g., Almquist et al., 2016; Platt et al., 2016). Similarly, health selection may take place when individuals in declining health selectively participate in social interactions and consequently experience reduced and limited social support. Mobilization theory provides an alternative perspective by predicting that poor health will lead to high social support, positing that close relationships are responsive to the health needs of their loved ones by providing support (Schwarzer & Leppin, 1991). In the long-term process of intergenerational exchanges, children may provide such support to parents in declining health to repay support they received from parents at an earlier time (Wan & Antonucci, 2016).

Instrumental Support as a Key Aspect of Intergenerational Relations

Intergenerational support provided by adult children to their older parents is sensitive to contextual factors of place and culture, including a region's level of economic development, political structure, and cultural norms (Silverstein & Giarrusso, 2010). Rural China provides a unique context to investigate the processes of intergenerational support and health and how these processes are associated with each other over time. Due to the scarcity of public resources and traditional familial norms in rural China, adult children tend to be the primary source of support and care of aging parents (Lin & Pei, 2016). Among different types of intergenerational support,

instrumental support is most likely to occur in such a context (Shi, 1993). Instrumental support takes on different forms, such as household chore help and personal care. Household chore help captures the assistance associated with complex tasks that involve high level of autonomy, decision-making capacities, and interactions with the external environment, compared to other types of instrumental support, such as personal care (World Health Organization, 2001). Different types of instrumental support tend to have differing trajectories among older adults in rural China over time (Mao et al., 2019). Hence, this study focused on household chore help as the key aspect of instrumental support.

Dynamic Interplay between Instrumental Support and Health in Later Life

There has been a limited amount of research that has investigated the dynamic association between support from others (including adult children) in general, instrumental support in particular, and SRH among community-dwelling older adults over time using longitudinal data in repeated panels. More critically, previous longitudinal studies have been unable to examine the sequence of change in the processes of support and health, thus precluding inferences regarding the dynamic relationship between received instrumental support and SRH among older adults over time (e.g., Li et al., 2009, Minkler & Langhauser, 1988; Van Tilburg, 1998).

Research in Western countries shows the relationship between instrumental support and SRH over time to be inconsistent. Instrumental support and SRH were not associated over time among older Americans in Alameda County (Minkler & Langhauser, 1988). However, research in the Netherlands found some evidence of a positive association between changes in support from others—including adult children—and changes in SRH over time (Van Tilburg, 1998). We found no recent study examining the influence of instrumental support on SRH among older adults over time in the Western literature.

In rural Chinese context, a limited number of studies have examined the association between support from children and SRH among older adults. Evidence from cross-sectional studies has been inconsistent, finding positive influences of support from children on SRH (Liang et al., 2014) or no significant association with SRH (Song et al., 2008). More importantly, findings from two population-based longitudinal studies have found that the receipt of instrumental support was associated with health decline over time. Li et al. (2009) found that an increase in instrumental support from adult children, including help with chores and personal care, between two time points was shown to be associated with worsening self-rated health among older men over time using random-effects logistic regression models with pooled data. Mao et al. (2019) found that household chore help from children was associated with faster decline in SRH over time among older adults using parallel latent growth curve models.

Both sets of findings are consistent with those of the social breakdown theory.

The dynamic interplay, or reciprocal relationship between support from children and SRH over time, has only been examined quite recently. However, the focus of such studies has not been on a specific type of instrumental support, but rather on general social interactions (Ha et al., 2017) or types of social networks (Li & Zhang, 2015). Both studies employed autoregressive cross-lagged models using longitudinal population-based data (Ha et al., 2017; Li & Zhang, 2015). These studies suggest that poor SRH tended to inhibit subsequent social interactions or social networks in later life, not the reverse, possibly indicating a health selection process. We advance this line of research by specifically focusing on the receipt of instrumental support from adult children and SRH among older adults in rural China, a sociocultural context where children are critically important in serving the needs of their older parents. We seek to better understand the directionality in the reciprocal relationship between the two dynamic processes being studied by analyzing longitudinal data from a long-term study of older adults living in a rural area of China.

Gender, Instrumental Support, and SRH

There has been accumulative empirical evidence on gender differences in SRH, wherein women tend to report poorer SRH than men (Idler, 2003). Recent research shows that the meaning and the underlying structure of SRH are comparable in both women and men, and gender differences in SRH reflect such differences in health (Zajacova et al., 2017). On the other hand, gender differences in social interactions, connectedness, and valuing support have seemingly been evident. For instance, women tend to invest more in cultivating relationships and support, and they are more likely to have larger, more diverse social networks and more social support than men (Caetano et al., 2013; Cheng & Chan, 2006).

Previous cross-sectional studies have yielded mixed findings on gender differences in the relationship between social support and health among older adults. Some argued for no gender difference in this relationship due to negligible differences (Cheng & Chan, 2006), whereas some argued for confirmed gender differences in such a relationship (Caetano et al., 2013). However, as seen in previous research, a potential gender difference in the relationship between instrumental support and SRH over time among older adults has rarely been studied. Li et al. (2009) found a significant positive relationship between increased instrumental support and decline in SRH over time among older men, not older women. Much remains unknown when it comes to the potential gender differences in the support and health processes over time in later life. Whether the reciprocal relationship between instrumental support from children and SRH over time among older adults would vary by gender warrants further exploration. Acquiring such information would be valuable to demystify whether gender differences exist in the bidirectional change processes of support and health over time in later life.

The Present Study

Given the dearth of studies of the reciprocal relationship between change in support and health over time, this study focused on the dynamic interplay between instrumental support from children and SRH among older adults over time, using bivariate latent change score modeling. Specifically, changes in both instrumental support and health over time and, more importantly, the sequence of those changes over time were investigated. This research engages the theoretical debate about the potential reciprocal association between social support and health over time in later life, that is, whether they are driven by social causation or health selection. This research further engages the debate about whether social support is health damaging or responsive to health decline over time among older adults, that is, whether social breakdown or support mobilization provides a better explanation of the process observed. This research further entertains the possibility that the relationship between instrumental support and SRH over time might be different for women and men, and separate investigation for such processes in men and women is warranted. The following research questions and hypotheses were addressed in this study: What is the relationship between intergenerational instrumental support (i.e., household chore help from children) and SRH over time? Is their relationship reciprocal? How do these relationships differ by gender?

> **Hypothesis 1:** Receipt of instrumental support predicts subsequent changes in SRH among older adults over time.
> (a) Receipt of instrumental support predicts better subsequent SRH (social causation).
> (b) Receipt of instrumental support predicts worse subsequent SRH (social breakdown).
>
> **Hypothesis 2:** SRH predicts subsequent changes in the receipt of instrumental support among older adults over time.
> (a) SRH predicts lower subsequent instrumental support (health selection).
> (b) SRH predicts higher subsequent instrumental support (support mobilization).
>
> **Hypothesis 3:** The bidirectional relationship between instrumental support and health processes varies by gender.

Method

Sample

Data used in this study came from five waves of a longitudinal study titled *The Well-Being of Older People* in Anhui

Province conducted in 2001, 2003, 2006, 2009, and 2012 and collected jointly by the School of Gerontology and School of Social Work at the University of Southern California and the Population Research Institute of Xi'an Jiaotong University. Adults aged 60 years or older residing in the rural region of Chaohu in Anhui Province were randomly selected based on administrative records using stratified multistage sampling. Standard back-translation was used to ensure the accuracy of the questionnaire in Mandarin. The survey was conducted in each respondent's home and covered topics on family relations and physical health status. 1715 of the 1800 older adults completed the survey at baseline (2001), yielding a response rate of 95.3%. There were initially 1636 respondents (857 females and 779 males) who reported having at least one child at baseline. Attrition due to mortality at each subsequent data collection point ranged from 13.94% to 20.54% over the 11 years (Zuo et al., 2014). Full information maximum likelihood estimation was used to deal with missing data over time. This statistical approach used allows us to use all valid data for these individuals in our analyses (e.g., Wahl et al., 2010). The models were estimated based on all available information from 857 females and 777 males using this approach. Two cases containing information missing on outcome data at the baseline were excluded. Multiple imputation was not considered due to similar outcomes dealing with missing data in longitudinal studies (Young & Johnson, 2015). This study falls under the exempt category under the guidelines set by the Institutional Review Board at the University of Nevada, Reno.

Receipt of household chore help. Respondents were asked to report how often they received household help (RHH) (e.g., cleaning house, washing clothes, and washing dishes) during the previous 12 months from sons, daughters, daughters-in-law, and sons-in-law on a 5-point scale (0 = *none*, 1 = *seldom*, 2 = *several times per month*, 3 = *at least once per week*, and 4 = *every day*). A summated score was calculated by adding frequencies of help received from each source, with a theoretical range of 0–16. Higher scores indicated higher levels of household help received. Such a measure has shown robustness in capturing instrumental support from adult children (Mao et al., 2019).

Self-rated health. SRH was measured by one global item: "How do you assess your current health status?" This item featured a 4-point response set (1 = *poor*, 2 = *fair*, 3 = *good*, and 4 = *very good*). Higher scores indicated better SRH. The single-item global rating has been found to have robust validity in Chinese older adult populations (Li et al., 2007; Zeng et al., 2002).

Covariates. First, we used "gender" as a grouping variable in the analyses, given the limited empirical evidence on gender differences in support and health over time among older adults (e.g., Li et al., 2009) and, more importantly, the

unaddressed literature gap on the potential gender differences in the bidirectional support and health relationships over time among older adults. Gender was a dichotomous variable contrasting *males* (referent) with *females*. Second, we considered "age," as changes in support and health occur as individuals age (Craigs et al., 2014). Age at baseline was treated as a continuous variable. Third, we included "education," which comprised two groups, including *no formal education* versus *some education* (referent). Education, reflecting socioeconomic status, was shown to be a strong correlate with health judgment and, subsequently, health status across the life span (Zajacova et al., 2017). Age and education were regressed on latent slopes and latent intercepts, respectively, in the models to control for their influences in the change processes over time.

Analyses

We used bivariate latent change score modeling (Ferrer & McArdle, 2010; McArdle, 2009) to examine the cross-influence of the two factors of interest that also change over continuous and discrete units of time. This technique is especially useful when the empirical design involves estimating trajectory patterns (growth or decline) and predicting lagged change between processes (Ferrer & McArdle, 2010; McArdle, 2009). Statistical comparisons of models specifying alternative time-lagged associations are especially helpful in assessing the directionality of influence in dual processes over time (e.g., Liao et al., 2018). Bivariate latent change score modeling offers the assessment of both change (growth or decline) and the mutual interrelationship between the two dynamic processes being studied (Ferrer & McArdle, 2010). The application of such modeling helps unravel the dynamic interrelation between the two processes. With the application of a dynamic modeling technique, this study aimed to establish directionality in the reciprocal relationship between instrumental support and SRH over time in later life.

In bivariate latent change score models, latent changes are composed of three elements: an additive constant change, scores for the same variable at the previous occasion, and scores for another variable at the previous occasion. The last component, the coupling parameter, represents the influence of one variable at one occasion (e.g., receipt of instrumental support from children) on changes in another variable at the next occasion (e.g., perceptions of health in older adults) as the two interrelated dynamic processes unfold over time. In other words, it represents the effect of one variable on subsequent intraindividual change in another variable (e.g., Orth et al., 2008). In this study, those dynamic coefficients jointly reflect the dynamic interplay between instrumental support and health over time.

Figure 1 is an illustration of the path diagram of a bivariate latent change score model. Path coefficients *a* and *b* represent the coupling effect component. Path coefficient *a* represents the effect of intergenerational instrumental support at one
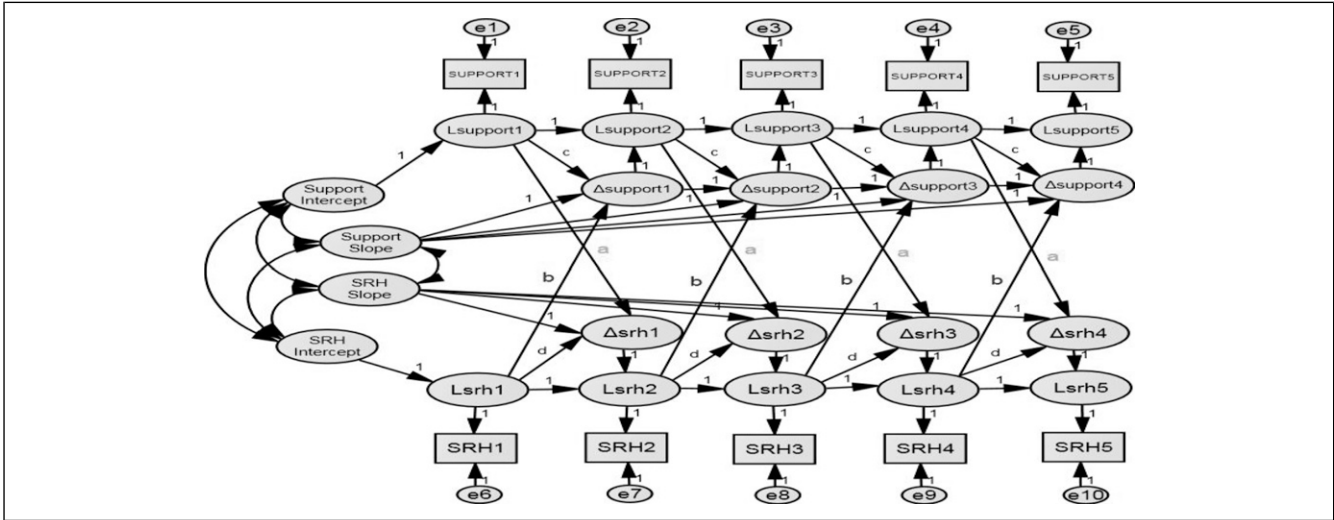
Figure 1. Diagram of a bivariate latent change score model for intergenerational instrumental support and SRH at five occasions over 11 years.

Note. Support = instrumental support, SRH = self-rated health, Lsupport = latent variable of instrumental support, Lsrh = latent variable of self-rated health, and Δ = change in corresponding variable between two time points. Path coefficients *a* and *b* represent the coupling effect component. Path coefficient *a* represents the effect of intergenerational instrumental support at one occasion on SRH at the next occasion and path coefficient *b* represents the effect of SRH at one occasion on intergenerational instrumental support at the next occasion. Path coefficients *c* and *d* represent the self-feedback component. Path coefficient *c* represents the effect of intergenerational instrumental support at one occasion on itself at the next occasion. Path coefficient *d* represents the effect of SRH at one occasion on itself at the next occasion.

occasion on SRH at the next occasion, and path coefficient *b* represents the effect of SRH at one occasion on intergenerational instrumental support at the next occasion. Path coefficients *c* and *d* represent the self-feedback component. Path coefficient *c* represents the effect of intergenerational instrumental support at one occasion on itself at the next occasion. Path coefficient *d* represents the effect of SRH at one occasion on itself at the next occasion.

Before the full model analyses, univariate latent change score models were fitted to receipt of household chore help and SRH over time. Bivariate latent change score with multiple groups by gender, adjusted for covariates, was then examined. Sequential goodness-of-fit tests for the bivariate latent change score models were conducted to determine the best fitting model to the data (baseline model: parameters were all held equal across gender; the model with free initial levels; the model with free slope means in addition to free initial levels; the model with free proportional change in addition to free initial levels and free slope means; and the model with free cross-lag effects in addition to free initial levels, free slope means, and free proportional change). It is important to note that estimating growth parameters captures developmental change in each process, with latent change capturing between-wave differences in the detrended data, above and beyond what occurs due to developmental change.

Model fit was assessed according to goodness-of-fit indices including χ^2 statistics and the root mean square error of approximation (RMSEA). A good model fit is suggested when the value of RMSEA is below .06 (Buhi et al., 2007).

Chi-square difference tests for model comparison were calculated, and a significant chi-square difference value indicates the model with less constraints fits the data significantly better. Akaike information criterion (AIC) and Bayesian information criterion (BIC) were also used to compare model fit across models, and lower values indicate a better model fit (e.g., Read et al., 2020). These model fit assessments are often used and reported in studies using a similar design (e.g., Read et al., 2020; Wahl et al., 2010).

Results

Table 1 reports the sample characteristics based on the complete cases by gender for SRH, receipt of household chore help, and covariates. In the sample, at the baseline, females were on average 72 years old ($SD = 7.4$), and 95% of them had no formal education. Males were on average 69 years old ($SD = 6.92$), and 62% of them had no formal education. According to changes in sample means, there was no apparent linear pattern for the receipt of household chore help and SRH over time, irrespective of gender. There were no apparent multicollinearity issues observed across five time points.

Table 2 shows the univariate latent change score model for household chore help received and SRH over time. Model fit indices suggested good model fit for both models (SRH: $\chi^2(14) = 29.3$, $p < .01$; RMSEA = .027; receipt of household chore help: $\chi^2(13) = 69.9$, $p < .001$; RMSEA = .052). The average (μ) initial level of the receipt of household chore

Table 1. Sample Characteristics of Complete Cases.

| Group | Variable | Measurement occasion | | | | |
		T1	T2	T3	T4	T5
Females	RHH					
	N	712	570	435	341	243
	Mean (SD)	3.47 (3.72)	3.48 (3.71)	3.54 (3.81)	3.15 (3.93)	3.52 (4.06)
	SRH					
	N	849	689	527	397	280
	Mean (SD)	1.94 (0.82)	2.02 (0.87)	1.81 (0.81)	1.78 (0.79)	1.83 (0.80)
	Age (years)					
	N	857				
	Mean (SD)	72 (7.4)				
	No education					
	N	857				
	%	95				
Males	RHH					
	N	561	408	335	280	202
	Mean (SD)	2.98 (3.9)	2.78 (4.18)	2.14 (2.78)	2.35 (3.04)	2.23 (3.27)
	SRH					
	N	769	616	483	365	270
	Mean (SD)	2.17 (0.87)	2.33 (0.97)	2.12 (0.95)	2.03 (0.85)	1.95 (0.92)
	Age (years)					
	N	779				
	Mean (SD)	69 (6.92)				
	No education					
	N	778				
	%	62				

Note. RHH = received household help; SRH = self-rated health. T1 = Time 1, T2 = Time 2, T3 = Time 3, T4 = Time 4, and T5 = Time 5. *SD* = standard deviation.

help was 3.292 ($p < .001$), and the rate of change over time was .497 ($p < .05$). In other words, at the baseline (2001), older adults received relatively low levels of household chore help on average and experienced an increase over time. The average (μ) initial level of SRH was 2.094 ($p < .001$), and the rate of change over time was $-.992$ ($p > .05$).

Table 3 demonstrates the sequential goodness-of-fit indices for the bivariate latent change score models of the receipt of household chore help and SRH among older adults by gender. Based on the model fit statistics and sequential model comparison tests, the bivariate latent change score model with a coupling effect from support to health fits the data significantly better (free cross-lag effects [RHH → SRH]: $\chi^2(135) = 260.3$, $p < .001$; RMSEA = .034; $\Delta\chi^2(6) = 86.3$, $p < .001$; AIC = 34,693.724; BIC = 34,882.681). This indicates that received instrumental support was the leading indicator of SRH over time, and not the other way around.

Table 4 shows results from the bivariate latent change score models with coupling effect from the receipt of household chore help to SRH among older adults over time by gender. For females, the results show initial means (μ) of 3.672 ($p < .001$) for the receipt of household chore help and 1.982 ($p < .001$) for SRH. They also show significant substantial variation in initial levels of the receipt of household chore help ($\sigma = 2.349$, $p < .001$) and SRH ($\sigma = .200$, $p < .001$). The growth estimates indicate that changes in both variables

Table 2. Univariate Latent Change Score Model for Household Chore Help Received and SRH: Unstandardized Parameter Estimates.

| Parameter | RHH | | SRH | |
	Estimate	SE	Estimate	SE
Regression coefficients				
Self-feedback (α)	$-.246^{***}$	.055	.462	.270
Means (μ)				
Intercept	3.292^{***}	.100	2.094^{***}	.020
Slope	$.497^{**}$	.167	$-.992$	.555
Variances (σ)				
Intercept	4.868^{***}	.604	$.271^{***}$	.021
Slope	$.573^{***}$	.162	.065	.069
Error	9.924^{***}	.333	$.520^{***}$	.014

Note. RHH = household help received; SRH = self-rated health; SE = standard error; CI = confidence interval; RMSEA = root mean square error of approximation. Model fit statistics for the RHH model: $\chi^2 = 29.3$, df = 14, $p < .01$, RMSEA = .027, and 90% CI RMSEA = [.013, .040]. Model fit statistics for the SRH model: $\chi^2 = 69.9$, df = 13, $p < .001$, RMSEA = .052, and 90% CI RMSEA = [.040, .064].
$^{**}p < .05$. $^{***}p < .001$.

were a function of (a) a positive linear slope (household chore help: $\mu = 1.591$, $p < .05$; SRH: $\mu = .889$, $p > .05$), with some individual variability (household chore help: $\sigma = .762$, $p > .05$; SRH: $\sigma = .883$, $p < .01$); (b) a negative autoproportion

Table 3. Summary of Sequential Goodness of Fit for Latent Change Score Models for Received Household Chore Help and SRH by Gender.

Model	df	χ^2	RMSEA (ε_a)	90% CI RMSEA	Δdf	$\Delta\chi^2$	AIC	BIC
All equal across gender	141	346.6***	.042	.037, .048	—	—	34,767.951	34,924.515
Free initial levels	139	305.6***	.038	.032, .044	2	41.0***	34,730.993	34,898.356
Free slope means	137	305.3***	.039	.033, .045	4	41.3***	34,734.690	34,912.850
Free proportional change	135	281.3***	.036	.030, .042	6	65.3***	34,714.679	34,903.637
Free cross-lag effects (SRH → RHH)	135	281.4***	.036	.030, .042	6	65.2***	34,714.800	34,903.758
Free cross-lag effects (RHH → SRH)	135	260.3***	.034	.028, .040	6	86.3***	34,693.724	34,882.681

Note. df = degrees of freedom; RMSEA = root mean square error of approximation; CI= confidence interval; AIC = Akaike information criterion; BIC = Bayesian information criterion; RHH = household help received; SRH = self-rated health. Δdf = changes in degrees of freedom; $\Delta\chi^2$ = changes in chi-square value. Covariates included age and education.
***p < .001.

Table 4. Latent Change Score Models for Household Chore Help Received and SRH by Gender: Unstandardized Parameter Estimates.

Parameter	Female		Male	
	Estimate	SE	Estimate	SE
Regression coefficients				
RHH self-feedback (α)	−.518**	.192	−.672***	.198
SRH self-feedback (α)	−1.185***	.236	−.939***	.211
RHH → change in SRH (coupling path a: γ)	.427***	.107	.445***	.107
SRH → change in support (coupling path b: γ)	=0		=0	
Means (μ)				
RHH intercept	3.672***	.219	3.318***	.190
SRH intercept	1.982***	.061	2.180***	.047
RHH slope	1.591*	.661	1.655**	.579
SRH slope	.889	.549	.751	.525
Variances (σ)				
RHH intercept	2.349***	.337	2.349***	.337
SRH intercept	.200***	.030	.200***	.030
RHH slope	.762	.501	.762	.501
SRH slope	.883**	.330	.883**	.330
RHH error	10.807***	.301	10.807***	.301
SRH error	.510***	.017	.510***	.017

Note. RHH = household help received; SRH = self-rated health; SE = standard error. χ^2 (male) = 169.5; χ^2 (female) = 90.9. Covariates included age and education.
*p < .05. **p < .01. *** p < .001.

(household chore help: $\alpha = -.518$, $p < .01$; SRH: $\alpha = -1.185$, $p < .001$), representing the influence of the variable on itself over time; and (c) a positive coupling parameter ($\gamma = .427$, $p < .001$), representing the influence of support at the previous occasion on SRH. These findings indicate that the level of receipt of household chore help is a positive predictor of subsequent change in SRH at all four time intervals over 11 years. Older Chinese women who received lower levels of household chore help at one time point were expected to report decreased SRH at the subsequent time point.

For males, the results show initial means (μ) of 3.318 ($p < .001$) for the receipt of household chore help and 2.180 ($p < .001$) for SRH. They also show significant substantial variation in initial levels of the receipt of household chore help ($\sigma = 2.349$, $p < .001$) and SRH ($\sigma = .200$, $p < .001$). The

growth estimates indicate that changes in both variables were a function of (a) a positive linear slope (household chore help: $\mu = 1.655$, $p < .01$; SRH: $\mu = .751$, $p > .05$), with some individual variability (household chore help: $\sigma = .762$, $p > .05$; SRH: $\sigma = .883$, $p < .01$); (b) a negative autoproportion (household chore help: $\alpha = -.672$, $p < .001$; SRH: $\alpha = -.939$, $p < .001$), representing the influence of the variable on itself over time; and (c) a positive coupling parameter ($\gamma = .445$, $p < .001$), representing the influence of support at the previous occasion on SRH. These findings indicate that the level of receipt of household chore help is a positive predictor of subsequent change in SRH at five data collection points over 11 years. Older Chinese men who received lower levels of household chore help at one time point were expected to report decreased SRH at the subsequent time point.

Discussion

To answer the research questions, this study investigated changes in the receipt of household chore help and SRH over time, the direction of these associations, and the sequence of changes in both variables among older adults over a period of 11 years. This study demonstrated that the receipt of help with household chores from adult children was a leading predictor of subsequent SRH over time. In other words, older adults who received higher levels of household chore help at one time point were expected to experience improvements in SRH by the subsequent time point. However, we did not find a reciprocal relationship in which changes in SRH would also predict subsequent changes in instrumental support among older adults over time. Thus, we found partial support for our main hypothesis of a reciprocal relationship between instrumental support and SRH over time. The findings supported Hypothesis 1, but not Hypothesis 2. Specifically, the findings confirmed Hypothesis 1(a), supporting the social causation theory. That we found a similar pattern for males and females did not support our expectation of gender differences in this relationship over time (Hypothesis 3).

The findings of this investigation add to our knowledge about the relationship between intergenerational support and health in later life within a culturally traditional context. The findings lend support to the social causation theory that social support is beneficial to subsequent health (e.g., Cohen & Wills, 1985), but did not support the health selection theory that poor health leads to low support (e.g., Ha et al., 2017; Li & Zhang, 2015), nor the social breakdown theory that support leads to poor health (e.g., Li et al., 2009; Mao et al., 2019). Because these changes were examined concurrently and sequentially, our findings provide an improved depiction of the relationship between support and health processes over time. Receiving household chore help from children played a protective role in the subsequent SRH among older adults over time. We speculate that receiving instrumental support, potentially as a result of its emotional benefits in reducing vulnerability to poor health outcomes, may strengthen the subjective evaluation of health status among older adults. In rural China, there are few public programs and interventions available to provide support and care services to older adults (Shi, 1993). Families and adult children in particular are expected to support and care for older adults as they age, according to the cultural value and norm of filial piety and as outlined in contemporary laws (Mao & Chi, 2011). It is of great practical importance to recognize the health protective function of intergenerational instrumental support over time and develop programs, interventions, and policies that could help maintain and strengthen such support in a rural context where formal old-age support is often lacking.

Not surprisingly, our findings did not confirm that instrumental support from children should be unrelated to subjective health in women, as shown in Li et al. (2009). Despite previous literature suggesting that women tend to treat social connectedness differently and rate their SRH differently compared to men, our findings indicate that the mechanism in which social support influences SRH over time in later life should not differ merely based on gender. Our findings suggest that instrumental support from children is beneficial toward better subsequent SRH over time for both older men and older women. This is important to notice in order to inform practice and policy to ensure the well-being of older adults, irrespective of gender, especially in a rural, collectivistic, and traditionally patrilineal context where public assistance is far scarce.

There are several limitations that need to be noted. First, causality in the relationships observed cannot be definitively assumed. Although we used longitudinal data that accounted for lagged measures and examined prospective change in the outcomes, as well as detrended the data for patterned change, causal relationships in these observational data are difficult to establish because of the possibility that unobserved spurious factors are not accounted for in the model. Further, SRH as a subjective indicator of health is evaluative in nature and may not capture objective need as fully as other measures of health. This may explain the absence of evidence that SRH mobilizes instrumental support. Instrumental support only captured frequency of support but no other aspects, such as quality. Additionally, our study focused only on instrumental support from children, which may overlook support from other sources, such as grandchildren. Other limitations are related to the study design. Attrition may have led to biased results despite full information maximum likelihood estimation because of the assumption that data were missing at random, and limited generalizability of our findings, given the use of a regional sample of older adults residing in rural areas of China. Five waves of data with repeated measures are invaluable, and the last wave of data was collected in 2012, making the data used in this study relatively up-to-date. Finally, due to the complexity of the modeling configurations and convergence criteria, we were only able to include a limited number of covariates. We tried to add covariates such as functional limitations or chronic conditions. However, the inclusion of such variables caused linear dependency in the model, resulting in unreliable results. We were unable to keep additional variables in the model. We speculate that objective measures of health might be subsumed by SRH, as it is an overall evaluation of one's health. Future studies should continue using advanced dynamic methodology to explore the relationship between different dimensions of social support and physical health outcomes and examine potential pathways or mechanisms between social support and health over time in later life.

Conclusion

The basic finding of the present study is that change in intergenerational instrumental support is positively associated with change in SRH over time among older adults. This

emphasizes the importance of the protective role of intergenerational instrumental support in promoting health among older adults. Health professionals in China should help raise awareness and educate the general public about the health benefits of intergenerational instrumental support in later life, and design programs and interventions that encourage and strengthen such support. Despite the scarcity of public resources and programs in rural China, supportive strategies to aid adult children caring for their aging parents are timely, such as the provision of subsidies or compensation to adult children who provide instrumental support to aging parents and the provision of extended paid leave or flexible work schedule that allows adult children to fulfill those responsibilities. Practice and policy efforts could also consider reducing stress in providing such instrumental support to aging parents and increasing competencies in providing quality instrumental support. These supportive strategies will go far toward encouraging adult children to provide instrumental support to their parents in a nation in which family members are increasingly challenged to be care providers but still guided by values of filial piety.

Declaration of Conflicting Interests

Funding

ORCID iD

Weiyu Mao ⬤ https://orcid.org/0000-0003-3629-0882

References

Almquist, Y. B., Landstedt, E., & Hammarström, A. (2016). Associations between social support and depressive symptoms: Social causation or social selection-or both? *The European Journal of Public Health*, *27*, 84-89. doi:10.1093/eurpub/ckw120

Bengtson, V. L., Settersten, R. A., Kennedy, B. K., Morrow-Howell, N., & Smith, J. (2016). *Handbook of theories of aging* (3rd ed.). Springer.

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*, *51*, 843-857. doi:10.1016/S0277-9536(00)00065-4

Buhi, E. R., Goodson, P., & Neilands, T. B. (2007). Structural equation modeling: A primer for health behavior researchers. *American Journal of Health Behavior*, *31*, 74-85. doi:10.5993/AJHB.31.1.8

Caetano, S. C., Silva, C. M., & Vettore, M. V. (2013). Gender differences in the association of perceived social support and social network with self-rated health status among older adults: A population-based study in Brazil. *BMC Geriatrics*, *13*, 122. http://www.biomedcentral.com/1471-2318/13/122

Cheng, S.-T., & Chan, A. C. M. (2006). Social support and self-rated health revisited: Is there a gender difference in later life? *Social Science & Medicine*, *63*, 118-122.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, *98*, 310-357. doi:10.1037/0033-2909.98.2.310

Craigs, C. L., Twiddy, M., Parker, S. G., & West, R. M. (2014). Understanding causal associations between self-rated health and personal relationships in older adults: A review of evidence from longitudinal studies. *Archives of Gerontology and Geriatrics*, *59*, 211-226. doi:10.1016/j.archger.2014.06.009

Ferrer, E., & McArdle, J. J. (2010). Longitudinal modeling of developmental changes in psychological research. *Current Directions in Psychological Science*, *19*, 149-154. doi:10.1177/0963721410370300

Ha, J.-H., Kahng, S. K., & Choi, N. (2017). Reciprocal effects between health and social support in older adults' relationships with their children and friends. *Research on Aging*, *39*, 300-321. doi:10.1177/0164027515611182.

Hornby-Turner, Y. C., Peel, N. M., & Hubbard, R. E. (2017). Health assets in older age: A systematic review. *BMJ Open*, *7*, Article e013226. doi:10.1136/bmjopen-2016-013226

Idler, E. L. (2003). Discussion: Gender differences in self-rated health, in mortality, and in the relationship between the two. *The Gerontologist*, *43*, 372-375.

Idler, E., & Cartwright, K. (2018). What do we rate when we rate our health? Decomposing age-related contributions to self-rated health. *Journal of Health and Social Behavior*, *59*, 74-93.

Kröger, H., Pakpahan, E., & Hoffmann, R. (2015). What causes health inequality? A systematic review on the relative importance of social causation and health selection. *European Journal of Public Health*, *25*, 951-960. doi:10.1093/eurpub/ckv111

Li, S., Song, L., & Feldman, M. W. (2009). Intergenerational support and subjective health of older people in rural China: A gender-based longitudinal study. *Australasian Journal on Ageing*, *28*, 81-86. doi:10.1111/j.1741-6612.2009.00364.x

Li, Y., Aranda, M. P., & Chi, I. (2007). Health and life satisfaction of ethnic minority older adults in mainland China: Effects of financial strain. *The International Journal of Aging and Human Development*, *64*, 361-379. doi:10.2190/9053-2G67-4X22-1211

Li, T., & Zhang, Y. (2015). Social network types and the health of older adults: Exploring reciprocal associations. *Social Science & Medicine*, *130*, 59-68. doi:10.1016/j.socscimed.2015.02.007

Liang, J., Zhang, P., Zhu, X., Qiao, Y., Zhao, L., He, Q., Zhang, L., & Liang, Y. (2014). Effect of intergenerational and intragenerational support on perceived health of older adults: A population-based analysis in rural China. *Family Practice*, *31*, 164-171. doi:10.1093/fampra/cmt073

Liao, J., Muniz-Terrera, G., Head, J., & Brunner, E. J. (2018). Dynamic longitudinal associations between social support and cognitive function: A prospective investigation of the directionality of associations. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *73*, 1233–1243. doi:10.1093/geronb/gbw135

Lin, Z., & Pei, X. (2016). Intergenerational exchange of resources and elderly support in rural China. *The International Journal of Aging and Human Development*, *83*(2), 108-127. doi:10.1177/0091415016647728

McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology*, *60*, 577-605. doi:10.1146/annurev.psych.60.110707.163612

Mao, W., & Chi, I. (2011). Filial piety of children as perceived by aging parents in China. *International Journal of Social Welfare*, *20*, S99-S108. doi:10.1111/j.1468-2397.2011.00826.x

Mao, W., Chi, I., & Wu, S. (2019). Multidimensional intergenerational instrumental support and self-rated health among older adults in rural China: Trajectories and correlated change over 11 years. *Research on Aging*, *41*, 115-138. doi:10.1177/0164027518783512

Minkler, M., & Langhauser, C. (1988). Assessing health differences in an elderly population: A five-year follow-up. *Journal of the American Geriatrics Society*, *36*, 113-118. doi:10.1111/j.1532-5415.1988.tb01779.x

Orth, U., Berking, M., Walker, N., Meier, L. L., & Znoj, H. (2008). Forgiveness and psychological adjustment following interpersonal transgressions: A longitudinal analysis. *Journal of Research in Personality*, *42*, 365-385. doi:10.1016/j.jrp.2007.07.003

Pavela, G. (2015). Functional status and social contact among older adults. *Research on Aging*, *37*, 815-836. doi:10.1177/0164027514566091

Platt, J. M., Lowe, S. R., Galea, S., Norris, F. H., & Koenen, K. C. (2016). A longitudinal study of the bidirectional relationship between social support and posttraumatic stress following a natural disaster. *Journal of Traumatic Stress*, *29*, 205-213. doi:10.1002/jts.22092

Read, S., Comas-Herrera, A., & Grundy, E. (2020). Social isolation and memory decline in later-life. *The Journals of Gerontology: Series B*, *75*, 367-376. doi:10.1093/geronb/gbz152

Schwarzer, R., & Leppin, A. (1991). Social support and health: A theoretical and empirical overview. *Journal of Social and Personal Relationships*, *8*, 99-127. doi:10.1177/0265407591081005

Shaw, B. A., Krause, N., Liang, J., & Bennett, J. (2007). Age versus time since baseline as the time scale in the analysis of change. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *62*, S203-S204. doi:10.1093/geronb/62.2.S90

Shi, L. (1993). Family financial and household support exchange between generations: A survey of Chinese rural elderly. *The Gerontologist*, *33*, 468-480.

Silverstein, M., Chen, X., & Heller, K. (1996). Too much of a good thing? Intergenerational social support and the psychological well-being of older parents. *Journal of Marriage and the Family*, *58*, 970-982. doi:10.2307/353984

Silverstein, M., & Giarrusso, R. (2010). Aging and family life: A decade review. *Journal of Marriage and Family*, *72*, 1039-1058.

Song, L., Li, S., Zhang, W., & Feldman, M. W. (2008). Intergenerational support and self-rated health of the elderly in rural China: An investigation in Chaohu, Anhui province. In Y. Zeng, D. L. Poston, Jr., D. A. Vlosky, & D. Gu (Eds.), *Healthy longevity in China: Demographic, socioeconomic, and psychological dimensions* (pp. 235-249). Springer.

Umberson, D., Crosnoe, R., & Reczek, C. (2010). Social relationships and health behavior across the life course. *Annual Review of Sociology*, *36*, 139-157. doi:10.1146/annurev-soc-070308-120011

Umberson, D., & Montez, J. K. (2010). Social relationships and health: A flashpoint for health policy. *Journal of Health and Social Behavior*, *51*, S54-S66. doi:10.1177/0022146510383501

Van Tilburg, T. (1998). Losing and gaining in old age: Changes in personal network size and social support in a four-year longitudinal study. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *53B*, S313-S323.

Wahl, H.-W., Schmitt, M., Danner, D., & Coppin, A. (2010). Is the emergence of functional ability decline in early old age related to change in speed of cognitive processing and also to change in personality? *Journal of Aging and Health*, *22*, 691-712. doi:10.1177/0898264310372410

Wan, W.H., & Antonucci, T.C. (2016). Social exchange theory and aging. In N. A. Pachana (Ed.), *Encyclopedia of geropsychology* (pp. 1-9). Springer.

World Health Organization. (2001). *International classification of functioning, disability and health (ICF)*.

Young, R., & Johnson, D. R. (2015). Handling missing values in longitudinal panel data with multiple imputation. *Journal of Marriage and Family*, *77*, 277-294. doi:10.1111/jomf.12144

Zajacova, A., Huzurbazar, S., & Todd, M. (2017). Gender and the structure of self-rated health across the adult life span. *Social Science & Medicine*, *187*, 58-66. doi:10.1016/j.socscimed.2017.06.019

Zeng, Y., Vaupel, J. W., Xiao, Z., Zhang, C., & Liu, Y. (2002). Sociodemographic and health profiles of the oldest old in China. *Population and Development Review*, *28*, 251-273. doi:10.1111/j.1728-4457.2002.00251.x

Zuo, D., Li, S., Mao, W., & Chi, I. (2014). End-of-life family caregiving for older parents in China's rural Anhui province. *Canadian Journal on Aging*, *33*, 448-461.