



Research article

The dyadic effects of family resilience and social support on quality of life among older adults with chronic illness and their primary caregivers in multigenerational families in China: A cross-sectional study

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ABSTRACT

Older adults with chronic illness, as well as their primary caregivers in multigenerational families, may experience a complex interplay of factors that affect their quality of life (QOL). However, this interplay is not yet well-characterized for Chinese multigenerational families in particular. In this study, we analyzed how family resilience and social support affect the QOL of both older adults and caregivers in multigenerational Chinese families specifically. We enrolled 258 pairs of older adults with chronic illness and their primary caregivers in a multicenter cross-sectional study conducted in southern China in December 2021. Using the Actor-Partner Interdependence Model (APIM), we then examined the correlation between family resilience, social support, and QOL in dyadic analysis and found that QOL, family resilience, and social support for primary caregivers were better than those of older adults with chronic illness ($t = 3.66\text{--}16.3, p < 0.01$). These factors were found to be positively correlated ($r = 0.22\text{--}0.60, p < 0.05$), except for the family resilience of primary caregivers and the QOL of older adults with chronic illness ($r = -0.14, p = 0.04$). Additionally, actor effect results showed that when a dyadic member has high family resilience and objective social support, they tend to have a better QOL ($\beta = 0.5\text{--}1.48, P < 0.01$). However, partner effect results showed that when the primary caregiver has high family resilience, this is associated with a worse QOL for the older adult ($\beta = -1.06, P < 0.01$). Furthermore, we found that objective social support of dyads does not significantly influence their partner's QOL ($\beta = 0.88/0.31, P > 0.05$) for any pair. This suggests that medical staff should pay attention to the impact of family resilience on the QOL of older adult and caregiver dyads and explore health management plans that focus on binary coping in multigenerational families.

1. Introduction

Chronic illnesses are health conditions that last for a year or more and often require continual medical attention [1]. Approximately

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264 million older Chinese adults (75.8%) suffer from at least one chronic illness [2]. The most common chronic conditions include hypertension, diabetes, and dyslipidemia [3]. Furthermore, around 14% of these older adults live in three-generation (or more) extended families with blood relatives [4]. Multigenerational cohabitation can traditionally provide family support and intergenerational assistance, enhancing overall QOL. There is a negative correlation between the depression level of older adults and their intergenerational relationships and family social support [5]. Older adults who enjoy positive intergenerational relationships with their children tend to experience adequate family social support and are more likely to have fewer symptoms of depression and greater subjective well-being [5].

As primary caregivers, family members frequently provide essential homecare support to older adults with chronic illness [6]. Caregiving can provide benefits to caregivers as well though, including increased confidence, resilience, and stronger family bonds [4]. Although caregivers often provide an invaluable service to their families, it frequently comes at a great personal cost. Studies have shown that higher caregiver burden is associated with poorer self-rated health and reduced QOL [7].

Primary caregivers often experience negative impacts, especially on their psychosocial well-being. A systematic review of cross-sectional studies found that caregivers experience higher rates of psychological distress, including symptoms of anxiety or depression, compared to non-caregivers within the same family [8]. A causal relationship was even established between caregiving and psychological distress through longitudinal studies. These studies revealed a significant decline in well-being as caregiver responsibility increases, further deterioration in well-being as care demand increases, and recovery after a care recipient passes away [9]. However, intervention studies have shown that e-health interventions on caregiver burden can significantly improve both depression and QOL [10], providing powerful evidence of a causal connection between caregiving and psychological outcomes.

The world's population is aging rapidly. In this context, it is often considered ideal for grandparents, parents, and children to live together or near each other in many countries [6]. In China, in particular, it is common for families to have three generations living together. In a family that spans several generations, caregivers may include spouses, siblings, and children. Clan, friends, and colleagues are also important sources of support for caregivers and older adults with chronic illness. Intergenerational co-residence provides benefits such as multigenerational emotional and material support [11], and studies have found that living in multigenerational households can increase both cohesion and conflict compared to one and two-generation homes [12]. In addition, QOL presents more complex characteristics in multigenerational families than those without such relationships [11]. However, the interaction between QOL and its various influencing factors is not well understood in multigenerational families in China especially. This affects the accuracy and effectiveness of dyadic coping interventions for caregivers and older adults with chronic illness. Therefore, it is important to study the interaction between the QOL of older adults with chronic illness and their primary caregivers in multigenerational families in China.

Family resilience and social support act as protective factors for both caregivers and older adults with chronic illness, helping them to maintain their QOL [13,14]. Family resilience refers to the ability or trait of a family to recover and adapt from adversity and crises, and social support is the act of providing free assistance to others through a network of material and emotional resources [15]. Chronic illness can have a significant negative impact on families, but caregivers and older adults with high family resilience can effectively reduce these negative effects and help them adapt to challenges [15]. Furthermore, when caregivers and older adults face economic, physiological, or psychological challenges, social support is crucial for improving their confidence and ability to manage chronic illness within the family [14].

Studies have shown that family resilience and social support are both strongly positive correlated with personal QOL [16,17]. Older adults and their caregivers in multigenerational families may experience improved physical and psychological health through higher levels of family resilience and social support [18]. When studying multigenerational families dealing with chronic illness, it's important to consider the complex interdependence and interaction between older adults and their caregivers, and analyzing data by focusing on individual members of a family may overlook any interdependence that exists within the data. Implementing the Actor-Partner Interdependence Model (APIM) [19] can address this challenge, and we therefore used it to carry out dependent statistical analysis of partners in various family relationships.

This study explored how family resilience and social support impact the QOL of older adults with chronic illness and their primary caregivers using a binary approach. Specifically, we hypothesized that there is a reciprocal relationship between the QOL of older adults with chronic illness and their primary caregivers in multigenerational families in China that is influenced by family resilience and social support. During our exploration, we attempted to answer the following three questions: (1) What are the differences in family resilience, social support, and QOL between older adults with chronic illness and their primary caregivers in Chinese multigenerational families? (2) How do family resilience and QOL of older adults with chronic illness and their primary caregivers depend on each other? (3) How do social support and QOL of older adults with chronic illness and their primary caregivers depend on each other?

2. Methods

2.1. Study design

This study was a community-based cross-sectional study conducted in three cities in southern China where multigenerational cohabitation is common: Quanzhou, Jinjiang, and Putian. We used a convenience sampling method to recruit older adults with chronic illnesses and their primary caregivers from community residents we encountered while they were taking part in outdoor activities in community center during the month of December 2021.

2.2. Sample selection

Study participants were selected in a 1:1 ratio between older adults who suffer from chronic illness and their primary caregivers. Taking older adults with hypertension and their primary caregivers as an example, to be able to discern significant effects with statistical parameters set to $\alpha = 0.05$, $\beta = 0.80$, and $r = 0.45$, 26 dyads of older adults with hypertension and their primary caregivers were needed [20]. Additionally, the minimum sample size required for structural equation modeling (SEM) was calculated to be 200 [21]. Thus, to ensure the stability of an APIM model constructed using SEM, a sample size of no less than 200 dyads of older adults with chronic illness and caregivers was necessary.

The inclusion criteria for older adults with chronic illness were: (1) self-reported (by the older adults) diagnosis of a major chronic disease; (2) age 60 years or older; (3) receipt of home care; and (4) at least one caregiver who is also a family member. The exclusion criteria were: (1) unwillingness to participate; and (2) inability to cooperate due to, for example, cognitive impairment or dyspnea.

The inclusion criteria for primary caregivers consisted of: (1) performance of primary care duties and management of diseases for older adults; (2) provision of care for at least six months; (3) age 18 or older; (4) membership in a family or clan; and (5) ability to complete the questionnaire orally or in writing. Exclusion criteria were: (1) receipt of payment for care; (2) cognitive impairment or mental illness; and (3) major physical disease or the inability to cooperate.

2.3. Measurements

We designed questions to collect anonymous demographic information such as age, gender, education, and religion. The questions for the older adults included the type and the duration of chronic illness, and questions for the caregivers included their relation to the older adult and the length of time they have been caring for the older adult's chronic illness.

We measured family resilience using the Chinese version of the Family Hardiness Index [22,23]. This index consists of 20 items classified into three dimensions, commitment, challenge, and control, that include 9, 5, and 6 items, respectively. Each item was rated on a Likert scale of 4 points, and the higher the score, the greater the family resilience of the respondent. The Cronbach's α in this sample was 0.79, indicating high internal consistency.

To measure social support, we used the Social Support Questionnaire [24], which comprises 10 items that assess objective support, subjective support, and degree of support utilization. A higher score on this questionnaire suggests a higher degree of social support perceived by the respondent. The Cronbach's α in this sample was 0.73, again indicating high internal consistency.

Next, the Short Form 36 Health Survey Questionnaire (SF-36) [25] was used to measure the QOL of both older adult and their caregivers. This questionnaire includes 36 items across eight categories, namely physical functioning (PF), role physical (RP), bodily pain (BP), social functioning (SF), mental health (MH), role-emotional (RE), general health (GH), and vitality (VT). The total score is calculated by adding the scores of all eight categories, and a higher score indicates a better QOL. Here, the Cronbach's α in the sample was 0.87.

2.4. Data collection

The questionnaires were conducted in the outdoor areas of the aforementioned communities by eight college students with one to two years of investigational experience who collected the questionnaires only after receiving unified training. The investigators explained the purpose and significance of the questionnaire survey to the participants and obtained their written informed consent. An older adult with chronic illness and a primary caregiver from the same family completed the questionnaire independently and self-evaluated simultaneously. For those who were illiterate, the investigators verbally read the questions and marked the questionnaire answers according to the older adult's or caregiver's responses. After the questionnaires were collected, the investigators checked each one for completeness. Some questionnaires were collected only from older adults or only from caregivers, and these were judged to be invalid and were summarily excluded from the analysis.

2.5. Ethical considerations

This study received ethics approval from the affiliated hospital of Nanjing University of Chinese Medicine (No. 2021NL-208-02). Participants were informed that they could refuse to participate or withdraw from the study at any time during the investigation and that their data would be kept confidential. We also assured them that their personal identities would not be disclosed in any public report on the results. The community management departments from the cities of Quanzhou, Jinjiang, and Putian also approved the investigation work, and all participants provided written informed consent to participate.

2.6. Statistical analysis

We analyzed demographic indicators after expressing them as numbers and percentages and family resilience, social support, and QOL after expressing them as mean \pm standard deviation (SD). To compare the differences and connections of social support, family resilience, and QOL for older adult and caregiver dyads, paired-sample t-tests, chi-squared tests, and Pearson correlation analysis were conducted using IBM SPSS V16.0. To analyze the interdependence of family resilience and social support on QOL, investigation results were treated as distinguishable dyad data and were standardized. AMOS (V21.0) was then used to test actor-partner effects.

The characteristics of older adult and caregiver dyads were first explored vis-à-vis general information. Paired analysis of family

resilience, social support, and QOL was then conducted to explore the differences and correlations between dyads. Statistically significant factors ($p < 0.05$) were identified for subsequent analysis. Finally, actor and partner effects of family resilience and social support on the QOL of older adult and caregiver dyads were measured and reported.

3. Results

3.1. Characteristics of older adult and caregiver dyads

A total of 524 questionnaires were distributed, of which 8 were collected from only older adults or primary caregivers and therefore invalid. Thus, 258 pairs of samples were finally included for a validity rate of 98.5%. Participants were asked to self-report their ethnicity and all participants reported being of Han ethnicity. Among the pairs of older adults and caregivers, 133 pairs involved a parent-child relationship, 67 were conjugal relationships, and 58 were other types of kinship, such as sibling. The majority of caregivers for older adults were of a different gender from the older adults. Table 1 shows that there was no statistical significant difference ($\chi^2 = 2.61, p = 0.11$) in gender between older adults and primary caregivers, although the primary caregivers were significantly younger than their older-adult cohorts ($\chi^2 = 39.75, p < 0.01$). The education level of the primary caregivers was higher than that of older adults on average as well ($\chi^2 = 82.01, p < 0.01$), and there was also a significant difference in religious involvement between older adults and caregivers ($\chi^2 = 15.89, p < 0.01$).

We also found that among older adults, 144 had cardiovascular or cerebrovascular diseases, 51 had respiratory diseases, and 84 had diabetes. Additionally, 23 older adults had multiple diseases. The duration of disease varied greatly, ranging from 1 to 40 years with a median of 9 years, and primary caregivers reported a median of 5 years of care work, with a range of 0.5–30 years. The daily care duration had a median of 4 h, ranging from 0.5 to 24 h.

3.2. Paired statistical results of older adult and caregiver dyads

Paired *t*-tests showed significant differences in mean family resilience, social support, and QOL between older adults with chronic illness and their primary caregivers. Primary caregiver scores on all of those questionnaires were higher than those of older adults with chronic illness. However, we did not find any statistical difference in the support utilization or responsibility in family resilience between older adults and their primary caregivers, as shown in Table 2.

3.3. Correlations of family resilience, social support, and QOL

Tables 3–4 show that there was a significant correlation between older adults with chronic illness and their primary caregivers in many aspects. Family resilience ($r = 0.30, P < 0.001$) and social support ($r = 0.43, P < 0.001$) perceived by older adults had a positive correlation with the QOL of their primary caregivers. However, family resilience perceived by primary caregivers had a negative correlation with the QOL of their older adults ($r = -0.14, p = 0.04$). There was no significant correlation between the QOL of older adults and caregivers' social support. Table 5 shows that objective social support from caregivers was positively correlated with the QOL of older adults ($r = 0.23, p < 0.01$) but that subjective social support and utilization of social support were uncorrelated ($r = 0.09/-0.34, p > 0.05$).

Table 1
Demographics of older adults and their caregivers ($n = 258$ dyads).

Variables	Older adults <i>n</i> (%)	Caregivers <i>n</i> (%)	χ^2	<i>P</i>
Age				
< 60 years old	0	177 (68.6)	39.75	< 0.01
60–80 years old	215 (83.3)	78 (30.2)		
> 80 years old	43 (16.7)	3 (1.2)		
Gender			2.61	0.11
Male	145 (56.2)	163 (63.2)		
Female	113 (43.8)	95 (36.8)		
Education			82.01	< 0.01
Primary	202 (78.3)	99 (38.4)		
Secondary	42 (16.3)	111 (43.0)		
College	14 (5.4)	48 (18.6)		
Religious involvement			15.89	< 0.01
Atheist	185 (71.7)	222 (86.0)		
Buddhism	46 (17.8)	31 (12.0)		
Taoism	17 (6.6)	3 (1.2)		
Christianity	3 (1.2)	1 (0.4)		
others	7 (2.7)	1 (0.4)		

Table 2

The social support, family resilience, and QOL characteristics of older adults with chronic illness and their primary caregivers ($n = 258$ dyads).

Variables	Older adults ($M \pm SD$)	Caregivers ($M \pm SD$)	t	p
<i>Family resilience</i>	57.01 \pm 5.32	58.04 \pm 4.68	3.66	< 0.01
Responsibility	26.69 \pm 2.68	26.98 \pm 2.43	1.92	0.06
Control	16.79 \pm 2.69	17.16 \pm 2.37	2.94	0.004
Challenge	13.53 \pm 1.80	13.90 \pm 1.62	3.10	0.002
<i>Social support</i>	42.28 \pm 7.31	46.14 \pm 5.56	8.73	< 0.01
Objective support	10.05 \pm 2.74	11.26 \pm 2.58	7.48	< 0.01
Subjective support	25.02 \pm 5.51	27.65 \pm 4.25	8.53	< 0.01
Support utilization	7.21 \pm 1.91	7.22 \pm 1.77	0.15	0.88
<i>QOL</i>	105.22 \pm 19.11	122.71 \pm 9.19	16.30	< 0.01
PF	24.33 \pm 6.33	29.29 \pm 1.57	13.42	< 0.01
RP	6.30 \pm 1.80	7.67 \pm 0.89	11.75	< 0.01
BP	9.52 \pm 2.36	11.42 \pm 1.23	13.26	< 0.01
GH	13.90 \pm 3.16	17.47 \pm 2.95	15.51	< 0.01
VT	15.93 \pm 3.16	17.90 \pm 2.44	10.18	< 0.01
SF	8.63 \pm 2.43	10.38 \pm 1.09	12.80	< 0.01
RE	5.02 \pm 1.31	5.71 \pm 0.77	8.40	< 0.01
MH	21.58 \pm 3.01	22.86 \pm 2.86	5.94	< 0.01

Note: physical functioning [PF], role physical [RP], bodily pain [BP], general health [GH], vitality [VT], social functioning [SF], role-emotional [RE], and mental health [MH].

Table 3

The correlation between family resilience and QOL in older adult and caregiver dyads ($n = 258$ dyads).

Variables	Older adult's family resilience	Caregiver's family resilience	Older adult's QOL
Older adult's family resilience	–	–	–
Caregiver's family resilience	0.60*	–	–
Older adult's QOL	0.22*	-0.14*	–
Caregiver's QOL	0.30*	0.34*	0.44*

Note: * $P < 0.05$.

Table 4

The correlation between social support and QOL in older adult and caregiver dyads ($n = 258$ dyads).

Variables	Older adult's social support	Caregiver's social support	Older adult's QOL
Older adult's social support	–	–	–
Caregiver's social support	0.42*	–	–
Older adult's QOL	0.49*	0.07	–
Caregiver's QOL	0.43*	0.35*	0.44*

Note: * $P < 0.05$.

Table 5

The correlation between the social support of caregivers and QOL of older adults ($n = 258$ dyads).

Caregiver's social support	Objective support	Subjective support	Utilization of support
Older adult's QOL	0.23*	0.09	-0.34

Note: * $P < 0.05$.

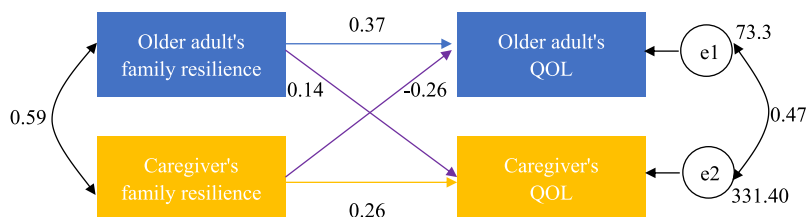


Fig. 1. The APIM for the family resilience and QOL of older adults with chronic illness and their primary caregivers (standardized regression weights).

3.4. Actor and partner effects on QOL with family resilience and objective social support

Based on the above correlation analysis results, we constructed two APIMs (Figs. 1 and 2). These models utilized family resilience and objective social support as predictive variables and QOL as the outcome variable. Multiple linear regression results showed that the independent variables had various effects on QOL ($\beta = -0.26-0.38$), and there was no evidence of multicollinearity ($VIF = 1.38-1.55$). Model parameters were estimated using maximum likelihood, and both models were found to be saturated ($\chi^2 = 0, df = 0, CFI = 1, NFI = 1$). Since all the parameters to be estimated were exactly equal to the elements in the covariance matrix, no other fitting indices were evaluated, and only the path coefficients were considered [26].

The APIM results (Table 6) showed that in actor effects both family resilience and objective social support positively predicted an individual's own QOL ($\beta = 0.5-1.48, P < 0.01$). In partner effects, the family resilience of caregivers had a negative impact on the QOL of older adults with chronic illness ($\beta = -1.06, P < 0.01$). However, the family resilience of older adults did not have a significant influence on the QOL of caregivers ($\beta = 0.25, P = 0.05$). Similarly, the objective social support of neither the older adult nor the caregiver had any effect on the other's QOL ($\beta = 0.88/0.31, P > 0.05$).

4. Discussion

4.1. Family resilience, social support, and QOL in older adults with chronic illness and their primary caregivers

According to the above results, primary caregivers had higher levels of family resilience, social support, and QOL compared to the older adults for whom they care, and this is consistent with the research conducted by other scholars [27,28]. The chronic illnesses of older adults often lead to lower QOL that can also affect family resilience and social support, and family resilience is essential for a family to maintain a positive mental attitude when dealing with disease management stressors [15]. Chronic diseases not only increase physical discomfort for older adults but also generate negative emotions such as anxiety, depression, and tension that can lower their family resilience [29]. Moreover, primary caregivers often provide support for the entire family, not just a given older adult with chronic illness, and this can make them more resilient in dealing with disease management stressors [30]. Caregivers must try their best to mobilize resources to cope with disease management. Throughout this process, they constantly adjust themselves and reshape their aspirations of hope, making them more proactive in seeking help compared to older adults with chronic illness [31,32].

4.2. The correlations between family resilience, social support, and QOL among older adults with chronic illness and their primary caregivers

The aforementioned correlation results suggest that QOL, family resilience, and social support among older adults experiencing chronic illnesses and their primary caregivers are positively correlated, except for the negative relationship between caregiver's family resilience and older adult's QOL. These correlations may be attributed to cognitive or behavioral patterns, which can be easily transferred and mutually influenced within patient-caregiver relationships [33]. The concept of objective social support refers to direct material assistance, participation in social networks, and stable sources of social connections, such as family, marriage, friends, and colleagues, and we found a positive correlation between objective social support received by primary caregivers and QOL of older adults. Other studies have also emphasized the importance of establishing relationships with healthcare professionals and family members (including caregivers) in maintaining the QOL of older adults [34]. What's more, a prominent gender difference has been documented with respect to men receiving more instrumental support from family and friends than women in the case of exercise encouragement and/or accompaniment [32]. In China specifically, men get more dietary-related support than women as well [6], often in the form of shopping for food and meal preparation.

4.3. The interaction of family resilience and QOL among older adults with chronic illness and their primary caregivers

We also found that family resilience and the QOL in older adult and caregiver dyads have different relationships. Chronic diseases not only cause physical pain to older adults but also create significant stress events for families, especially multigenerational cohabitation environments. Moreover, caregivers have indirect effects on the QOL of older adults through their need to maintain certain family functions [16]. Caregivers are also more prone to experiencing psychological impacts from chronic diseases than older

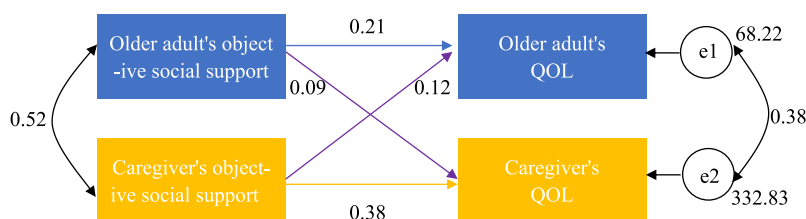


Fig. 2. The APIM for the objective social support and QOL of older adults with chronic illness and their primary caregivers (standardized regression weights).

Table 6Estimated actor and partner effects of family resilience and social support on the QOL in older adult and caregiver dyads ($n = 258$ dyads).

Effect Model	β	S.E.	C.R.	<i>P</i>
Actor effect				
Older adult's family resilience \rightarrow older adult's QOL	1.32	0.27	4.98	< 0.01
Caregiver's family resilience \rightarrow caregiver's QOL	0.50	0.14	3.54	< 0.01
Older adult's objective social support \rightarrow older adult's QOL	1.48	0.49	3.03	0.002
Caregiver's objective social support \rightarrow caregiver's QOL	1.35	0.24	5.75	< 0.01
Partner effect				
Caregiver's family resilience \rightarrow older adult's QOL	-1.06	0.30	-3.50	< 0.01
Older adult's family resilience \rightarrow caregiver's QOL	0.25	0.13	1.96	0.05
Caregiver's objective social support \rightarrow older adult's QOL	0.88	0.52	1.69	0.09
Older adult's objective social support \rightarrow caregiver's QOL	0.31	0.22	1.40	0.16

adults. Interestingly, older adult's poor perceptions of disease and prognoses have been shown to be predictors of poorer mental health in their caregiving partner [35].

We also found that the family resilience of primary caregivers has a negative correlation with the QOL of older adults with chronic illness, which is consistent with the findings of other studies [36]. One possible explanation for this correlation is that older adults with chronic illnesses take a long time to understand their own conditions and gain control over disease management [37]. As a result, an increase in the long-term family resilience of caregivers may cause psychological discomfort to older adults. Moreover, while dealing with their illnesses, older adults may be hesitant to communicate with their caregivers and express negative emotions, which can further impact their QOL. Research has shown that older adults' self-efficacy in maintaining the functions of daily life is associated with their QOL [38]. High degrees of support from caregivers can thus be considered a threat to an older adult's hope which itself is an inner source of QOL; lower levels of hope have been linked to lower QOL [39,40].

4.4. The interaction of objective social support and QOL among older adults with chronic illness and their primary caregivers

The presence of objective social support has a direct impact on the QOL in multigenerational families. Research specifically indicates that social support can influence health status both directly and indirectly [41,42], and the perceived objective social support between older adults and their caregiver dyads is positively related to their individual QOL. The greater the perceived objective social support, the better the QOL. Moreover, the sources of objective social support vary from one family to another. Studies have found that friend-support has a positive impact on individual QOL [43]. However, in multigenerational families, objective social support mostly comes from blood relatives, who play a more intimate role than friends. The concept of mutuality refers to a positive relationship between people, and is characterized by love and affection, shared pleasurable activities, shared values, and reciprocity, and the experience of mutuality among family members has a significant impact on QOL in cases of chronic disease [44]. There is strong evidence that caregiver partner effects have a positive impact on the physical health of heart failure patients, for example [45].

Additionally, we found no statistical correlation between the QOL and objective social support of older adults with chronic illness and their primary caregivers in the APIM. This could be due to factors such as the amount of care burden and strain that caregivers experience. This burden may affect their own physical and emotional health, and a low level of objective social support for caregivers has been shown to be a significant predictor of caregiver burden [46]. Furthermore, different sources of objective social support may have different impacts on QOL. Studies suggest that support from family and friends has a higher impact on the QOL of both older adults with multiple chronic conditions and their primary caregivers compared to support from significant others [47]. Caregivers who perceive greater support from family or friends also report better health related QOL for themselves and the older adults for whom they care [48].

4.5. Clinical implications and directions for future research

In this study, we found that the QOL of older adults with chronic illness and their primary caregivers' family resilience were negatively linked in multigenerational southern Chinese families. To account for statistical dependence in the data collected, we focused on older adult and caregiver dyads as a binary system. In this system, both parties actively support and cooperate with each other, seek internal and external support resources, and work together to improve each other's QOL. Future investigations should go further and assess the dual effects of different sources of objective social support on the personality traits of older adults with chronic illness and their primary caregivers.

4.6. Limitations

There are several limitations to this study. First, because of its community-based cross-sectional design, it is not possible to establish causality between family resilience, social support, and QOL. Second, cross-sectional data analyzed with APIMs may produce biased estimates of predictive and outcome variables. Third, the results of this study may not be generalizable since our participants were recruited only from three southern cities in China using convenience sampling. Fourth, some confounding factors, such as care burden, were not effectively controlled, which may have resulted in a weak link between objective social support and QOL. Future studies

should include more confounding factors.

5. Conclusion

This study examined how QOL is connected between older adults with chronic illness and their primary caregivers in Chinese multigenerational families. It examined how family resilience and social support influence this connection. Our results indicate that the QOL, family resilience, and social support of older adults with chronic illness and their primary caregivers are closely linked and interact with each other within the multigenerational family structure. In particular, the family resilience of primary caregivers has an indirect negative impact on the QOL of older adults with chronic illness, possibly through the caregivers' own self-efficacy and hope. To improve the QOL of older adults with chronic illness and their primary caregivers, we therefore find that it is important to evaluate family resilience and objective social support within the older-adult-caregiver dyad. This can help medical professionals to formulate interventions that target the specific needs of families in these situations.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

CRedit authorship contribution statement

Dan Lin: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Dong Liang:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Minqing Huang:** Writing – original draft, Investigation, Formal analysis. **Xinxin Xu:** Writing – original draft, Investigation, Formal analysis. **Yamei Bai:** Writing – review & editing, Validation, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization. **Dijuan Meng:** Writing – review & editing, Writing – original draft, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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