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Mediating and moderating roles of individual resilience, caring ability and social support: a cross-sectional study on the association between family resilience and caregiving burden among primary family caregivers of cancer patients in China

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ABSTRACT

Objectives This study aimed to evaluate the caregiving burden among primary caregivers of cancer patients, clarify the relationship between family resilience and caregiving burden, and explore the mediation and moderation effects.

Design A cross-sectional study design was used.

Setting The study was conducted at a specialised tumour hospital in Harbin, China.

Participants The study included a sample of 402 primary family caregivers of patients with cancer. Ultimately, 367 participants completed valid questionnaires, yielding a response rate of 91.2%.

Outcome measures Participants completed scales evaluating caregiving burden, caring abilities, individual resilience, family resilience and social support. We performed structural equation modelling to analyse mediation and moderation effects.

Results Out of 367 responses, approximately 50% of primary family caregivers reported moderate to severe caregiving burden. Family resilience was found to reduce caregiving burden ($\beta=-0.386$, $p=0.005$), while individual resilience fully mediated the relationship between family resilience and caregiving burden (95% CI −0.659 to −0.161). Caring ability moderated both the first and second halves of the mediating path. Furthermore, social support doubly moderated the moderating role of caring ability in both the first and second halves of the mediating path.

Conclusions This study demonstrated the mediating role of individual resilience and the moderating roles of caring ability and social support in the relationship between family resilience and caregiving burden. We suggest that medical institutions should enhance caregiving training and psychological counselling services. Additionally, the government should collaborate with medical institutions and social organisations to improve social welfare policies and the medical insurance system.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This study innovatively used a self-developed burden assessment scale specifically designed to measure the caregiving burden of primary family caregivers of cancer patients in China.
- ⇒ The study developed a complex model to explore the relationship between family resilience and caregiving burden among primary family caregivers of cancer patients, revealing the mediating and moderating roles of individual resilience, caring ability and social support.
- ⇒ While the findings may not be applicable to primary caregivers in other countries, they likely provide an accurate reflection of the burden experienced by many primary caregivers of cancer patients in China.
- ⇒ Data on exposure and outcomes were collected through self-reported questionnaires, which may have introduced reporting bias.
- ⇒ The cross-sectional design restricts our ability to infer causality from the results.

INTRODUCTION

With societal advancements and lifestyle changes, the global burden of cancer continues to escalate, reaching approximately 19.3 million new cases and 10 million deaths in 2020.[1] As the most populous country, China has the highest number of new cancer cases and deaths worldwide.[1] Cancer obviously affects patients but also brings a heavy burden to their families, especially their main family caregivers. Under the influence of the one-child policy and the traditional concept of filial piety, coupled with the imperfections of the existing care system, the primary family caregiver takes on the heavy burden of caring for the patient with cancer.[2 3] The professional care system in China is not well-established, and a 95% shortage of professional care institutions and highly qualified caregivers is estimated.[4] This huge shortfall in care must be filled by family caregivers. In addition, the low birth rate in nuclear families has become increasingly prominent,[2] which means that the burden of caring for patients falls on the primary family caregivers. Previous studies have found that over half of primary family caregivers of cancer patients experience moderate to severe burdens.[5 6] The caregiving burden is closely associated with the quality of life and mental health of the primary family caregivers.[7 8] One study has indicated that an excessive caregiving burden can significantly reduce the quality of life of family caregivers and lead to psychological distress.[7] Meanwhile, as the caregivers' burden increases, it not only impairs the quality of care they are able to provide, but also threatens the recovery and psychological well-being of the patients.[9] Milbury's research revealed that caregiving burden places both emotional and physical strain on caregivers, which may reduce the quality of care they are able and willing to provide, ultimately hindering patients' cancer adjustment and recovery.[9] Importantly, caregiving burden is not only associated with primary family caregivers, but also with other family members.[7] Therefore, understanding and exploring the caregiving burden is of crucial importance for supporting cancer patients, their family caregivers and their families.

Caregiving burden is a complex, multidimensional concept, which includes negative feelings that caregivers experience owing to the economic, physical, psychological and social aspects of the care process.[10] Since 1980, various tools have been developed to measure caregiving burden, such as the Zarit Caregiver Burden Interview and the Caregiver Reaction Assessment Scale. However, these scales were designed for chronic patient groups, while specific measurement tools for patients with cancer remain rare. Moreover, existing tools often lack comprehensive dimensions, particularly the consideration for empathy factors. Therefore, there is a pressing need to use the new tool specifically for measuring the burden on primary family caregivers of cancer patients.

Research indicates that caregivers reporting lower levels of family functioning tend to experience higher levels of burden when caring for cancer patients.[11] Families, as crucial support systems, can adapt and bounce back from adversity, a concept known as 'family resilience'.[12] Theoretically, Walsh's family resilience framework has provided a comprehensive analytical foundation, emphasising the importance of families fully mobilising resources to cope with overwhelming challenges through resilience.[13] Additionally, some previous studies have found that family resilience contributes to reduce caregiving burden among the primary family caregivers of patients with cancer,[14 15] indicating that it may be a key factor in alleviating their burden.

As the recognition of individual resilience's pivotal response role in family support systems grows, many previous studies have delved into the caregiving burden through the lens of family resilience and intertwining family and individual resilience with caregiving burden.[14 15] However, these researchers have predominantly centred on the individual resilience of cancer patients themselves, sidelining the resilience of family caregivers who provide continuous care and support to cancer survivors. A study on family caregivers of cancer survivors in Turkey shows that the individual resilience of family caregivers plays a negative role in regulating the caregiving burden.[16] Furthermore, while some scholars have identified the potential mediating role of individual resilience of cancer patients between family resilience and caregiving burden,[14] few studies have delved into whether the individual resilience of caregivers also acts as a mediator in this dynamic relationship.

Caring ability is regarded as the multidimensional comprehensive ability to complete caregiving tasks.[17] The primary caregiver of a family usually provides care services to patients with minimal guidance or prior preparation. However, few scholars have paid attention to the caring ability needs of the primary family caregivers of patients with cancer. The correlation between caring ability and burden is self-evident. In the face of the arduous and long-term tasks of caring for patients, caregivers with low caring ability may struggle to balance family, work, and social life, and the caregiving burden they face may increase.[18] Conversely, caregivers with high caring ability typically exhibit greater resilience and confidence in managing caregiving challenges.[19] However, caregivers without caring experience lacked the knowledge and skills to deal effectively with problems encountered when caring for patients, leading to psychological maladjustment and impacting family function and structure.[20] Therefore, there may be an interaction among caring ability, caregivers' family resilience, and individual resilience, although this hypothesis remains untested.

Noticeably, the lack of social support for caregivers significantly constrains the improvement of caring abilities. With a shortage of professional caregivers in China,[21] most family members often assume caregiving roles with limited abilities.[22] The absence of professional guidance and training can lead to safety incidents, undermining caregivers' confidence and increasing their burdens.[23] Conversely, adequate social support enables caregivers to improve their skills through specialised training by healthcare workers,[22] potentially enhancing the moderating role of caring ability.

Overall, the purpose of this study is to evaluate the caregiving burden among primary family caregivers of cancer patients, elucidate the association between family resilience and caregiving burden, and examine the mediating role of individual resilience as well as the moderating roles of caring ability and social support. To serve the above aims, the study hypothesises:

- Hypothesis 1: family resilience decreases caregiving burden.
- Hypothesis 2: individual resilience mediates the relationship between family resilience and caregiving burden.
- Hypothesis 3: caring ability moderates both the first and second halves of the 'family resilience-individual resilience-caregiving burden' mediation chain.
- Hypothesis 4: social support has a dual moderating effect on caring ability in the path 'family resilience-individual resilience-caregiving burden.'

METHODS

Participants and procedures

We conducted a cross-sectional study among selected primary family caregivers of outpatients and inpatients at the Third Affiliated Hospital of Harbin Medical University, located in Harbin, Heilongjiang Province, Northeast China. The data were collected between February and April 2023 using a convenience sampling method. We used on-site research and an anonymous survey to address potential common method bias (CMB). After obtaining participants' informed verbal consent, data were collected via self-report responses to an interviewer-administered questionnaire. Primary family caregivers included in this study were family members over 18 years old who took the major responsibility for caregiving of the relative of patients with cancer. Family members who were paid caregivers or who provided temporary care were excluded. All eligible participants were informed that their participation was voluntary and anonymous. The sample size of the study should ideally be at least 30 times the independent variable.[24] In total, we obtained 402 questionnaires. Questionnaires with incomplete responses (excluding sociodemographic information) were eliminated. Finally, 367 questionnaires were included in the analysis (effective response rate of 91.2%).

The inclusion and exclusion criteria for the participants are shown in online supplemental figure S1. This study was conducted in accordance with the Declaration of Helsinki. Participants who met the inclusion criteria were fully informed about the study objectives and procedures. Participation was voluntary, and participants were informed that they could withdraw from the study at any time without consequence. Informed consent was obtained through signed consent forms, in which participants acknowledged their understanding of the study and agreed to participate. To ensure confidentiality, identification numbers were used instead of personal identifiers. Specially trained researchers administered the survey, ensuring privacy and secure data handling. Ethics approval was obtained from the Ethics Review Committee of Harbin Medical University (approval number: HMUIRB20170016).

Variables

The variables included in the structured questionnaire were burden on primary family caregivers of patients with cancer; sociodemographic information of patients with cancer; and primary caregivers' caring ability, individual resilience, family resilience and social support. The sociodemographic information of patients with cancer included age group (27–51, 52–59, 60–67 and ≥68 years), sex, place of residence and type of medical insurance. The sociodemographic information of the primary family caregivers included age group (19–35, 36–43, 44–52 and ≥53 years), relationship with patient and employment status.

Dependent variables

The dependent variable was caregiving burden. We used a self-designed scale to measure participants' caregiving burden (online supplemental table S1).[25] The scale comprises 21 items scored on a 5-point Likert scale (0=*never*, 1=*occasionally*, 2=*sometimes*, 3=*often*, 4=*always*), which include five dimensions: empathy, negative emotions, physical, economic and social. Total scores ranged from 0 to 84, with higher scores indicating a heavier burden on primary family caregivers of patients with cancer. In the presurvey, the scale demonstrated good validity and reliability, with an average variance extracted of 0.5870, composite reliability of 0.9657 and Cronbach's α of 0.922.[25] In the present study, the Cronbach's α was 0.86, which also reflects good internal consistency.

Independent variables

We used the Chinese version of the Family Caregiver Task Inventory (FCTI)[17] to measure the caring abilities of primary family caregivers of patients with cancer. The FCTI comprises 25 items composed of five dimensions: learning to adapt to care roles, providing care according to the care-receiver's needs, managing one's own emotional needs, assessing supportive resources and balancing care needs and one's own needs. It is scored on a 3-point Likert scale (0=*not difficult*, 1=*difficult*, 2=*extremely difficult*), with a total possible score of 50 points. Higher scores indicated lower caring ability. The scale was validated in a group of primary caregivers from families of patients with cancer[18] and was consistent with this study (Cronbach's α=0.81).

We used the Chinese version of the 10-item Connor-Davidson Resilience Scale (CD-RISC-10) to evaluate caregivers' individual resilience.[26] The CD-RISC-10 comprised 10 items scored on a 5-point Likert scale (0=*never*, 4=*always*), with a total possible score of 40. The CD-RISC-10 reflects the ability to tolerate and overcome adverse situations, such as pressure, failure and painful feeling. Higher scores indicate higher levels of individual resilience. The scale was validated in a group of primary family caregivers of patients with cancer,[27] which is consistent with this study (Cronbach's α=0.87).

Family resilience was assessed using the Family Resilience Questionnaire developed by Bu and Liu,[28] which is suitable for the Chinese culture. It comprises 20 items in four dimensions: perseverance (six items), harmony (six items), openness (four items) and supportiveness (four items). Each item was answered on a 5-point Likert scale (1=*very non-conforming*, 5=*very conforming*), with a total possible score of 100. Higher scores indicate greater family resilience. The Family Resilience Questionnaire showed good reliability in a population of patients with cancer,[29] which is consistent with this study (Cronbach's α=0.86).

The Multidimensional Scale of Perceived Social Support (MSPSS) was developed by Zimet *et al*,[30] and the Chinese version of MSPSS was translated and tested by Huang *et al*.[31] It was used to assess participants' perceived support from family, friends and significant others. The scale contains 12 items scored on a 7-point Likert scale (1=*strongly disagree*, 7=*strongly agree*), with a total possible score of 84 points. Higher scores indicate a higher degree of social support. The Chinese version of the MSPSS was validated in a group of primary family caregivers of patients with cancer,[32] which was consistent with this study (Cronbach's α=0.88).

Statistical analysis

The data collected from the questionnaires were entered into Epidata 3.1 (the EpiData Association, Odense, DK) concurrently by two researchers, while a third researcher independently reviewed for inconsistencies and corrected any discrepancies in the original questionnaires. The frequencies and percentages of the sociodemographic information of patients with cancer and their main caregivers were calculated. Harman's single-factor test was used to test for CMB. The critical value of the caregiving burden score was determined using the quartile method as follows: scores from 0 to 20 were categorised as no burden (P0–P25); scores from 21 to 41 were categorised as mild burden (P25–P50); scores from 42 to 63 were categorised as moderate burden (P50–P75); and scores from 64 to 84 were categorised as heavy burden (P75–P100). The Q-Q diagram showed that family resilience, individual resilience, caregiving burden, caring ability and social support were all normally distributed variables; therefore, the means and SD were calculated using SPSS 26.0 (IBM, Armonk, NY, USA). Independent samples t-test and one-way analysis of variance were used to compare the differences of caregiving burden between groups of discrete variables. Pearson's correlation coefficients were used to explore the relationships between the continuous variables. *P* values <0.05 were considered significant.

We used AMOS 24.0 to estimate the mediation model with family resilience as the independent variable, individual resilience as the mediator and caregiving burden as the dependent variable. Bootstrapping (2000 resamples) was used to test the mediating effect. As the 95% bootstrap CIs did not contain zero, the estimated path coefficients were significant. We used maximum likelihood to fit the model. The moderating effects of caring ability and social support were validated separately using Model 58 in the PROCESS 4.1 plug-ins of SPSS 26.0. Consequently, Model 72 was used to explore the dual moderating role of social support on the moderating effect of caring ability.

Patient and public involvement

Patients and the public were not involved in the design, conduct, reporting or dissemination plans of this research.

RESULTS

Participant characteristics

Participants' general characteristics are shown in the supplementary materials (see online supplemental table S2). Most patients were older than 60 years of age; nearly 60% were in the late stage of cancer. There were 12.8% more male than female primary family caregivers, and most caregivers were aged 43–52 years. Caregivers were mainly patients' children or spouses, and nearly 60% had low academic qualifications and low incomes. Nearly half spent more than 12 hours per day on average caring for patients (online supplemental table S3).

Common method bias (CMB) test

Harman's single-factor test demonstrated that the characteristic roots of the 28 factors were greater than one, and the maximum factor explained 14.04% (< 40%) of the variation. Accordingly, CMB was not significant.

Descriptive statistics

Participants' mean caregiving burden score was 39.62 (S=13.48). Further, 39.2% of participants had mild burden, and 49.9% had moderate or heavy burdens. Family resilience, caring ability, individual resilience, social support and caregiving burden correlated with each other (online supplemental table S4), which was consistent with our hypotheses. We found no significant difference in the burden scores by cancer type (F=1.915, *P*=0.066).

Mediation testing

The results of the model of the relationship between family resilience and caregiving burden indicated good model fit (χ^2/df=2.219 < 3; IFI (Incremental Fit Index)=0.840, TLI (Tucker-Lewis Index)=0.828, CFI (Comparative Fit Index)=0.839, all>0.8; RMSEA (Root Mean Square Error of Approximation)=0.058 < 0.08). Family resilience significantly reduced caregiving burden (β=–0.386, *P*=0.005), supporting hypothesis 1.

With family resilience as the independent variable, caregiving burden as the dependent variable and caregivers' individual resilience as the mediating variable, the results showed a good model fit (χ^2/Df=2.151 < 3; IFI=0.817, TLI=0.806 and CFI=0.816, all>0.8; RMSEA=0.056 < 0.08). The 95% CI for the total effect and indirect effect of family resilience on caregiving burden did not contain zero; however, the 95% CI for the direct effect contained zero. This indicated that family resilience had a positive effect on individual resilience (β=0.768, *P*<0.001) and individual resilience had a negative effect on caregiving burden (β=–0.462, *P*<0.001); however, the direct effect of family resilience on caregiving burden was not significant (β=−0.054, *P*=0.719). The complete mediating effect of individual resilience on caregiving burden was −0.355, accounting for 86.8% of the total effect. The results are presented in online supplemental table S5 and figure S2. These results support hypothesis 2.

The moderating role of caring ability

Online supplemental table S6 presents the results of a model with family resilience as the independent variable, caregiving burden as the dependent variable, individual resilience as the mediating variable and caring ability as the moderating variable. We observed a significant interaction effect between caring ability and family resilience (95% CI −0.021 to −0.007, *P*<0.001). As shown in figure 1A, family resilience can predict individual resilience more strongly for caregivers with high caring abilities compared with their counterparts. Family resilience exhibited a significant predictive effect on individual resilience among caregivers with both low (β=0.168, 95% CI 0.106 to 0.229, *P*<0.001) and high (β=0.336, 95% CI 0.256 to 0.416, *P*<0.001) caring abilities (online supplemental table S7). According to the J-N diagram (figure 1B), better caring ability significantly enhanced the predictive effect of family resilience on individual resilience among caregivers with caring ability scores <20.320.

We observed a significant interaction effect between caring ability and individual resilience on caregiving burden (95% CI 0.011 to 0.081, *P*=0.010), thus supporting hypothesis 3. As shown in figure 2A, individual resilience had a stronger predictive effect on caregiving burden among caregivers with high caring abilities. The predictive effect of resilience on caregiving burden was not significant among caregivers with low caring abilities (β=−0.310, 95% CI −0.627 to 0.006, *P*=0.055). The predictive effect of resilience on caregiving burden was significant among caregivers with high caring abilities (β=−0.871, 95% CI −1.261 to −0.480, *P*=0.000; online supplemental table S8). As shown in figure 2B, the predictive effect of individual resilience on caregiving burden was significantly higher among caregivers with caring ability scores ≤14.472.

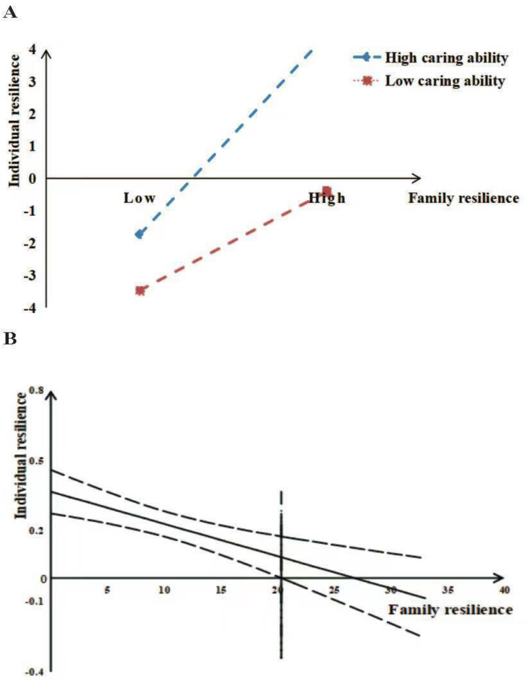

Figure 1 The moderating role of caring ability in the first half of the mediating path. (**A**) Simple slope diagram of family to individual resilience prediction by caring ability; (**B**) J-N diagram of the relationship between family and individual resilience by caring ability.

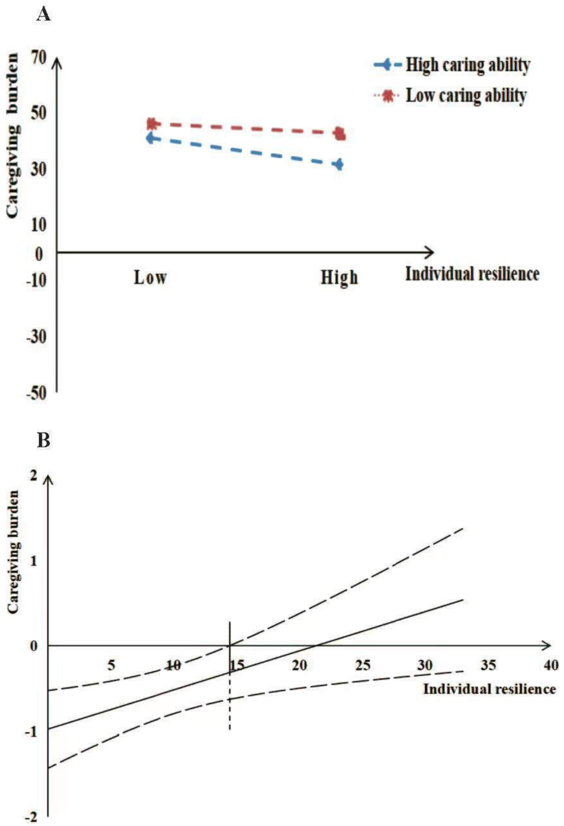

Figure 2 The moderating role of caring ability in the second half of the mediating path. (**A**) Simple slope diagram of family to individual resilience prediction by caring ability; (**B**) J-N diagram of the relationship between family and individual resilience by caring ability.

The dual moderating role of social support

To investigate whether social support plays a dual moderating role in the moderating effect of caring ability, we estimated a model with family resilience as the independent variable, caregiving burden as the dependent variable, individual resilience as the intermediary variable, and caring ability and social support as moderating variables. Table 1 presents the results. The interaction effect among family resilience, caring ability and social support is statistically significant (95% CI −0.002 to −0.001, *P*=0.001). Social support played a dual moderating role in the first half of the mediation path. The interaction term

Table 1 Mediated model tests for dual moderation

Result variables	Predictive variables	R^2	F	β	T	95% CI lower bound	95% CI upper bound
Individual resilience	Family resilience	0.347	27.197***	0.213	6.929***	0.153	0.274
	Caring ability			−0.215	−4.886***	−0.302	−0.129
	Social support			0.025	0.953	−0.026	0.075
	Family resilience * Caring ability			−0.013	−3.153**	−0.021	−0.005
	Family resilience * Social support			0.006	2.417*	0.001	0.011
	Caring ability * Social support			0.002	0.520	−0.006	0.010
	Family resilience * Caring ability * Social support			−0.001	−3.313**	−0.001	0.000
Caregiving burden	Family resilience	0.187	10.317***	0.111	1.282	−0.059	0.281
	Individual resilience			−0.586	−3.985***	−0.876	−0.297
	Caring ability			0.577	4.419***	0.320	0.834
	Social support			−0.026	−0.373	−0.165	0.113
	Individual resilience * Caring ability			0.039	2.066*	0.002	0.076
	Individual resilience * Social support			0.011	0.978	−0.011	0.034
	Caring ability * Social support			0.021	2.063*	0.001	0.042
	Caring ability * Social support * Individual resilience			0.003	2.970**	0.001	0.005

Note: *$P<0.05$, **$P<0.01$, ***$P<0.001$

of family resilience and caring ability negatively predicted individual resilience among participants with high levels of social support (β=−0.022, F=22.712, $P<0.001$). The slope of the combination of high social support and high caring ability was significantly higher than that of high social support and low caring ability ($P<0.001$; figure 3 and online supplemental table S9). We found that the interaction term of family resilience and caring ability on

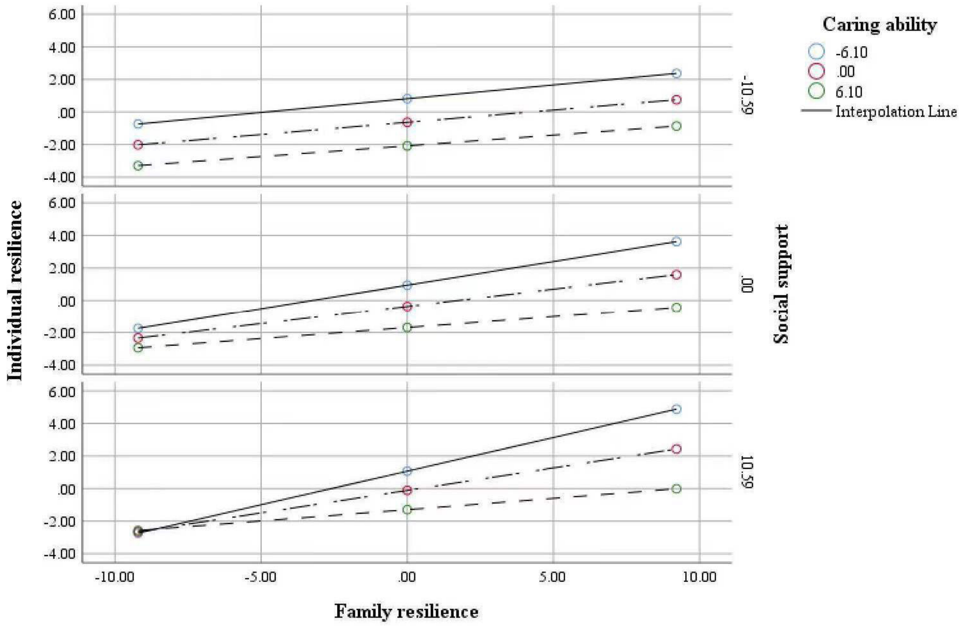

Figure 3 The dual moderating role of social support in the moderating effect of caring ability in the first half of the mediating path.

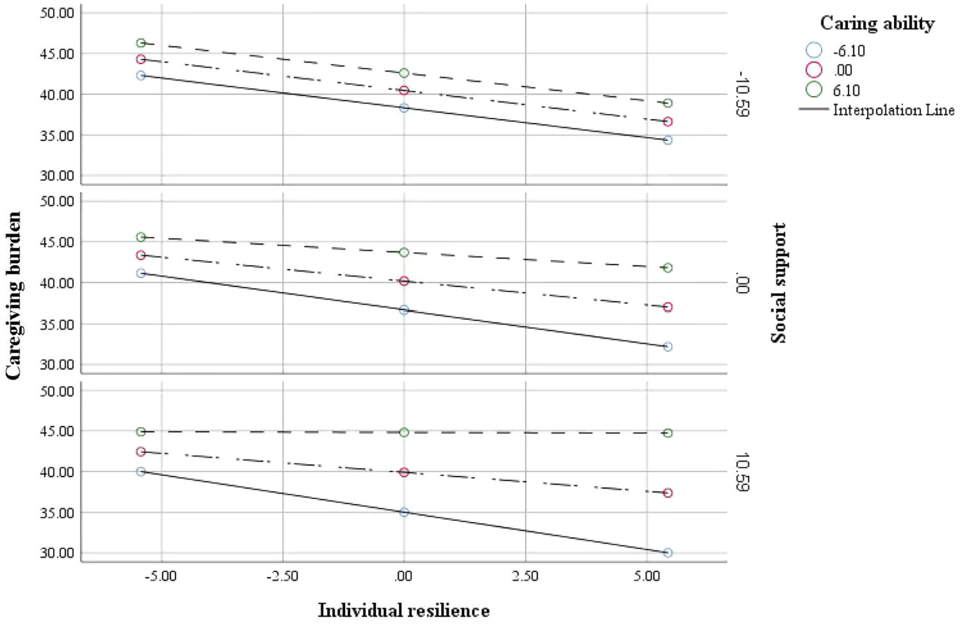

Figure 4 The dual moderating role of social support in the moderating effect of caring ability in the second half of the mediating path.

individual resilience was not significant among participants with low levels of social support (β=−0.003, F=0.322, *P*=0.571). The difference between the slope of the low social support and high caring ability combination and that of the low social support and low caring ability combination was not significant (*P*>0.05; figure 3 and online supplemental table S9).

The interaction effect among individual resilience, caring ability and social support is statistically significant (95% CI 0.001 to 0.005, *P*=0.003). The interaction between individual resilience and caring ability positively predicted the burden of care among participants with high levels of social support (β=0.074, F=12.376, *P*=0.001). The slope of the combination of high social support and high caring ability was significantly higher than that of the combination of high social support and low caring ability (*P*<0.01; figure 4 and online supplemental table S10). The predictive effect of the interaction between family resilience and caring ability on the burden of care was not significant among participants with low levels of social support (β=0.004, F=0.033, *P*=0.855). The difference between the slope of the low social support and high caring ability combination and that of the low social support and low caring ability combination was not significant (*P*>0.05; figure 4 and online supplemental table S10).

DISCUSSION

Our study aimed to evaluate the caregiving burden among primary family caregivers of cancer patients, clarify the relationship between family resilience and caregiving burden, and explore the mediation and moderation effects involved. This study innovatively used a self-developed burden assessment scale for primary family caregivers of cancer patients, revealing that approximately 50% of the caregivers in our sample experienced moderate to severe caregiving burden. Additionally, the study developed a complex mediation and moderation model, highlighting how family resilience alleviates caregiving burden through the mediating role of caregivers' individual resilience, with caring ability acting as a moderator. Social support also played a dual moderating role, enhancing the effect of caring ability in reducing caregiving burden. Our findings provide several policy recommendations to alleviate the burden on primary family caregivers.

Family resilience reduced participants' caregiving burden. This result is consistent with the findings of Sun *et al*.[33] However, family resilience did not directly impact caregiving burden but rather worked through individual resilience. Greater family resilience implies better support and relationships among family members, which helps caregivers cope with adversity and increase their individual resilience.[34] Caregivers with high individual resilience tend to adapt positively and quickly to the caring role and can handle the negative events of the patient's illness,[16] reducing their stress and burden. However, the majority of caregivers are in a state of fragile numbness, burdened with various aspects of stress, and unable to regulate negative emotions.[6] Therefore, medical institutions should provide comprehensive support mechanisms, such as implementing regular public welfare psychological counselling and treatment services for the primary caregivers of cancer patients, to alleviate their depression and stress. Moreover, the government should collaborate with mental health service organisations/associations to establish a hotline for psychological counselling, specifically for family members of patients with cancer, to provide an effective channel for them to confide and relieve their caregiving burden.

Caring ability moderated the first half of the mediating path. Related studies found that caregivers with high caring abilities can use nursing knowledge to care for patients and balance relationships with family members,[17] which could enhance caregivers' ability to respond to adversity and strengthen their individual resilience. Concurrently, caring ability also moderated the second half of the mediating path. This is consistent with other research that showed that caregivers with low caring ability were less able to regulate their negative emotions as compared with their counterparts, which led to poor adaptation to stress and adversity and weakened individual resilience, thereby increasing caregiving burden.[35]

Although some primary family caregivers of patients with cancer can enhance their caring abilities through interactions with fellow patients, healthcare professionals and online research, many of the primary family caregivers did not receive systematic training in professional care, resulting in them lacking sufficient knowledge and becoming overwhelmed with caring for patients.[3] Therefore, medical institutions should offer training to caregivers on disease knowledge and care standards and provide relevant information and manuals. Moreover, many families also need professional caregivers but face financial constraints.[36] To alleviate this, China has launched a pilot programme for long-term care insurance.[37] Currently, it remains in a limited pilot phase, and its implementation depends on medical insurance funding.[38] Thus, the government should expand the pilot programme by gradually increasing the coverage of long-term care, with the costs shared between the government and society, to promote healthy and sustainable development.[37]

In this study, we found that social support enhanced the moderating role of caring ability. Adequate social support suggests that caregivers may improve their caregiving skills through home-based skills training and emotional support provided by healthcare workers.[15] Despite this, we found more than 80% of participants reported medium or low levels of social support. To provide support to caregivers, China has introduced a care leave system, typically lasting 10 to 20 days,[39] which is insufficient for the needs of caregivers of family members with serious illnesses. Moreover, owing to the inadequacy of the care leave system, associated costs are largely borne by employers, resulting in difficulties in the effective implementation of the system.[39] Therefore, the government should adjust the duration of care leave and collaborate with multiple actors to establish a cost-sharing mechanism involving multiple stakeholders to enhance its effectiveness.[39]

The primary caregivers of families exhibited diverse and profound needs for social support. In addition to the aforementioned needs, the primary caregivers also demonstrated the following needs for social support. First, family caregivers have difficulties with medical insurance reimbursement, with the challenges of cancer drug reimbursement being particularly prominent. In recent years, there is a limited number of anticancer drugs in the medical insurance catalogue, and the cost of those not included in the medical insurance section is mainly borne by patients themselves.[40] This somewhat echoes the recommendation by Fang *et al*:[40] that the government should improve the medical insurance catalogue by adding anticancer drugs, reducing their prices and promoting research on high-quality generic drugs. Additionally, there is an urgent need for hospice care, as the number of hospices in China is insufficient and unevenly distributed, mostly concentrated in economically developed eastern regions.[36] The government should expand investments in hospice care and include it within the medical insurance catalogue. Meanwhile, it should encourage social forces to establish professional hospice care institutions, thereby expanding the availability of these services.

Limitations

This study had some limitations. First, this study used convenience sampling from a single centre, which may not reflect the overall situation of family caregivers of cancer patients in China. Future studies should expand the sample size and scope of the survey to identify more factors associated with caregiving burden. Second, we found no significant differences in primary family caregiving burden scores by cancer types and disease stage, likely because most patients in this study had moderate-to-advanced stage cancer (86.6%), resulting in uniformly high burdens (online supplemental table S2). Third, this study was limited in exploring the correlates of potential factors of caregiving burden. Further analyses of the relationship between family resilience and caregiving burden should be conducted to explore the relevant roles of other mediating and moderating variables.

CONCLUSION

This study demonstrated the mediating role of caregivers' individual resilience, moderating role of caring ability and dual moderating role of social support. We suggest that medical institutions strengthen the dissemination of knowledge and training on diseases and their care and improve the allocation of psychological counselling services. The government should further improve relevant policies and regulations to alleviate caregiving burden through various channels. Future research should explore the roles of other mediating and moderating variables.

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