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Research Article

Dyadic Effects of Social Support and Psychological Resilience on Distress in Disabled Elderly–Caregiver Pairs: An Actor-Partner Interdependence Mediation Model

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Keywords: Dyadic interaction effect, Social support, Psychological resilience, Psychological distress

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Background

Social support influences psychological resilience, which in turn affects disabled elderly and caregivers' psychological distress.

Objective

Based on the actor–partner interdependence model extended to mediation, we explore the interaction relationship between social support for disabled elderly and caregivers and the mediating role of psychological resilience in psychological pain.

Methods

A total of 214 disabled elderly individuals and their caregivers were surveyed using a general information questionnaire, Lubben Social Network Scale, Social Support Rating Scale, Connor–Davidson Resilience Scale, and distress thermometer (DT).

Results

Caregivers' social support (t = −11.2, p < 0.001) and psychological resilience (t = −6.38, p < 0.001) were significantly higher than those of the disabled elderly, while the psychological pain of the disabled elderly was significantly higher than that of caregivers (t = 5.21, p < 0.001). In the actor–partner mediation model, the social support of disabled elderly and caregivers played a fully and partially mediating role in their psychological pain, respectively, through psychological resilience. Moreover, the social support of caregivers had a partner effect on the psychological resilience and pain of disabled elderly people.

Conclusion

Both disabled elderly individuals and caregivers have significant mediating effects of psychological resilience between social support and psychological distress. The level of social support provided by caregivers can have an objective mediating effect on the psychological pain of disabled elderly people through their psychological resilience. The results suggest that in clinical research, the establishment of community support networks and flexible psychological interventions can help improve the psychological pain of disabled elderly people and their caregivers. Meanwhile, from the perspective of the actor-partner interdependence, future efforts should emphasize caregiver empowerment, improve their social support and psychological resilience, which will in turn help reduce psychological distress in the disabled elderly.

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1. INTRODUCTION

The aging society has become a global issue, and the growth of the aging population in China is accelerating. From 1982 to 2023, the elderly population in China increased from 7.54% to 21.07%.[1] During the aging process, the function of muscle tissue and organs in the human body gradually weakens, leading to a decrease in physiological function, adaptability, and resistance, which may result in disability.[2] The Seventh National Population Census shows that the population of the elderly aged 60 and above has reached 264 million, of which 16.6% are disabled. It is estimated that by 2030 and 2050, the number of disabled elderly people in China will respectively reach 61.68 million and 97.5 million.[3] Therefore, it is urgent to strengthen the construction of a support system for the care of disabled elderly to meet the growing demand for long-term care.

Currently, care for the disabled elderly is mainly delivered through two models: home-based care and institutional care.[4] Previous studies have shown that different care arrangements may have distinct effects on the health outcomes of both older adults and caregivers. Institutional care provides advantages in access to medical resources and professional support; however, research indicates that older adults in institutional settings may be more likely to experience loneliness, depressive symptoms, and reduced perceived autonomy.[5] In contrast, home-based care enables older adults to remain in familiar environments and maintain long-term close interactions with family members, which may contribute to positive emotional experiences, although the ultimate physical and psychological outcomes largely depend on the availability and quality of family support.[6]

Family caregivers providing long-term home care often experience substantial caregiving burden and psychological stress. Systematic review evidence suggests that high-intensity informal caregiving may adversely affect caregivers' physical and mental health. In comparison, professional caregivers in institutional settings may be more vulnerable to work-related stress and burnout.[7] Therefore, care context is an important factor that should not be overlooked when examining psychological and health-related outcomes.

Influenced by traditional concepts of filial piety, the vast majority of disabled elderly people in China choose home-based elderly care, with their family members taking on the main caregiving work. Therefore, they can be treated as a "dyad" and jointly studied as long-term home care challenges.[8]

Stress is an experience resulting from the interaction between the individual and the environment, which can lead to psychological or physical distress. It covers different levels of individual functioning, including physiological, cognitive, emotional, and social aspects.[9,10] For disabled elderly individuals, the sources of stress stem from impaired physical function, which limits their daily activities and is often accompanied by reduced social engagement and emotional deficits. Therefore, disabled elderly not only suffer from physical pain such as low mobility and chronic illnesses, but also from psychological distress, such as increased burden and even depression, due to the detachment of social roles and the collapse of self-efficacy.[11]

Caregiver stress stems from the long-term pressure of responsibility associated with caring for disabled elderly individuals. The persistent needs of disabled older adults for daily care, medical management, and emotional support often leave caregivers in a state of chronic role overload.[12] In the process of taking care of the disabled elderly, caregivers often feel burdened with heavy responsibilities, continuous and excessive stress, as well as anxiety of lacking socialization.[12] It is shown in some qualitative research that numerous caregivers need to give up their jobs and fully devote themselves to taking care of the disabled elderly at home, which not only increases their economic pressure and affects their possibility of self-realization, but also causes their excessive concern for the disabled elderly.[13,14] From the perspective of actor–partner interdependence, the stress and emotional distress of the two parties are mutually influential: the negative emotions of patients may exacerbate caregivers' sense of helplessness, and caregivers' stress, in turn, can heighten patients' sense of shame.[15] This vicious cycle will ultimately lead to a comprehensive decline in the quality of life for both parties.[16] Disabled elderly individuals and their caregivers endure long-term psychological burden and physical exhaustion caused by stress, which further triggers psychological distress.[17,18] Psychological distress is mainly manifested as anxiety and depression, exerting a significant impact on the quality of life of both parties.[19] Studies have shown that disabled elderly people generally have a relatively high level of psychological distress; physical changes due to disability impair their physiological functions, leading to more negative subjective evaluations of happiness.[20] In contrast, disabled elderly individuals with lower disability levels and better self-rated health status have higher mental health levels.[21] Therefore, paying attention to both disabled elderly and caregivers has become an important topic for family-centered research in recent years.[22]

External resources play an important mediating role in reducing psychological distress by alleviating stress experienced by both caregivers and disabled elderly individuals, thereby further improving their quality of life and well-being. According to the stress-buffering theory, the outcome of coping with disability stress depends on the dynamic coupling effect of internal and external resources.[23] For the dyad of disabled elderly and caregivers, external resources refer to the actual or perceived material or psychological social resources, including subjective and objective support, as well as their utilization.[24] For example, social support from friends, family, colleagues, and others can help reduce psychological distress.[23] For the disabled elderly, disability accompanied by a reduction in social activities may result in a significant reduction of social network, an important protective factor for social support, which can easily lead to psychological distress.[25] For caregivers, insufficient social support may also lead to heavy caregiving pressure, also resulting in psychological distress.[13] Therefore, enhancing social support may help to alleviate the psychological distress of disabled elderly people and their caregivers.[26]

Internal resources refer to an individual's psychological abilities and traits that help them cope with stress, challenges, and emotional fluctuations.[26,27] In recent years, the role of psychological resilience as an internal resource in positive psychology has been increasingly emphasized.[28] Psychological resilience refers to the ability to cope with adversity and adapt to major life events.[29,30] Numerous studies indicated that individuals with high psychological resilience may have good tolerance for negative emotions and a high sense of responsibility in completing challenging tasks, and confidence in overcoming difficulties.[26,31,32] The stress buffering hypothesis[33] suggests that psychological resilience, as a core resource for individuals to cope with stress related to disability, can directly reduce the intensity of

negative emotions by enhancing cognitive flexibility (such as the cognitive restructuring ability to cope with stressful events) and emotional regulation against adversity.[34] On the contrary, when the level of social support is low, individuals with different levels of psychological resilience experience varying degrees of psychological distress.[35] Both of the respective studies on disabled elderly and caregivers have found that certain individuals can maintain good mental health even with low social support.[36] Therefore, strong psychological resilience may independently lead to lower emotional distress.[34]

Comprehensively considering internal and external resources, the social support theory points out that high social support not only has a direct protective effect on psychological pain, but also plays an indirect buffering role by enhancing individual psychological resources[37], which means social support will positively affect psychological resilience. However, a previous study has shown that caregivers may still experience lower levels of psychological distress even with insufficient social support and heavy caregiving burden.[38] Therefore, for disabled elderly or caregivers, psychological resilience may play a mediating role between social support and psychological distress.

Numerous studies have treated disabled elderly individuals and their caregivers as two separate groups rather than an interdependent dyad. However, the interpersonal interaction theory emphasizes the unit composed of interactions between two individuals, since the thoughts and behaviors of two people in a dyadic relationship may influence one another.[39] Therefore, it should be taken into consideration to treat disabled elderly and caregivers as a dyad to delve into the interaction effects between these two variables. The actor–partner interdependence model extended to mediation (APIMeM) can be used to analyze how predictor variables affect outcome variables through mediator variables, providing a more comprehensive perspective and method for developing health promotion measures. Studies have found an interaction between the health literacy of disabled elderly and the caregivers' quality of life.[40] Depression in disabled elderly can indirectly affect caregiver burden through the mediating factor of caregiver psychological resilience.[41] There is also an interaction between the self-care ability and caregiver care ability of elderly people with disabilities at home and their psychological resilience.[41] Therefore, these findings collectively suggest that social support, resilience, and psychological distress among disabled older adults and their caregivers may form an interactive chain-mediated relationship within the dyadic system. For example, the social support received by caregivers may directly alleviate their own pain (the actor pathway), or indirectly reduce their burden by enhancing the psychological resilience of disabled elderly individuals (the partner pathway), while disabled elderly individuals may also feedback and influence caregivers. Based on this theoretical foundation, the dyadic relationship between resilience and psychological distress in disabled older adults and their caregivers was examined. The findings demonstrate a significant negative correlation between resilience and psychological distress for both dyad members, with the actor effect being twice the magnitude of the partner effect. However, previous studies[42] only focused on the correlation between psychological resilience and psychological pain, without delving into how psychological resilience affects psychological pain or introducing other factors (e.g., caregiving burden, loneliness, self-efficacy) to analyze the pathways of psychological pain in depth. This article explores the interrelationship among social support, psychological resilience, and psychological pain of disabled elderly and caregivers based on the APIMeM framework. It is used to analyze how the social support of both parties affects their own and each other's psychological pain, revealing more complex interaction mechanisms.

The purpose of the current study is to analyze the mediating role of psychological resilience in the interaction between social support and psychological distress of disabled elderly people and caregivers through the actor–partner interdependence mediation model. The research findings will help clarify how to improve the social support system for disabled elderly and caregivers to enhance their psychological resilience and improve their mental health under long-term care stress.

1.1. RESEARCH HYPOTHESES

The research hypotheses of the current study are as follows:

(i) H1 (actor effects):
- H1a: The social support of disabled elderly people and their caregivers is positively associated with their own psychological resilience.
- H1b: The psychological resilience of disabled elderly people and their caregivers is negatively associated with their own psychological distress.

(ii) H2 (mediation effect): Psychological resilience plays a mediating role between social support and psychological distress in disabled elderly people and their caregivers.

(iii) H3 (partner effects):
- H3a: An individual's social support is positively associated with their partner's psychological resilience.
- H3b: An individual's psychological resilience is negatively associated with their partner's psychological distress.

(iv) H4: Social support, psychological resilience, and psychological distress are interdependent within disabled elderly–caregiver dyads.

2. MATERIAL AND METHODS

2.1. ETHICAL CONSIDERATIONS

Ethical approval for this study was obtained from the Ethics Committee of the School of Nursing, Fudan University (approval number: IRB#TYSQ20200427). Questionnaires were distributed only after written informed consent had been obtained from both disabled elderly individuals and their caregivers.

2.2. PARTICIPANTS

From June 2024 to January 2025, community-dwelling disabled elderly individuals and their primary caregivers were recruited from three communities in Shanghai via a convenience sampling approach.

Inclusion criteria for disabled elderly individuals: (i) Aged 60 years or above. (ii) Classified as mild or more severe disability (e.g., malignant neoplasms, severe heart failure/coronary heart disease, severe stroke (with significant physical or cognitive impairment), end-stage renal disease, liver failure/severe liver cirrhosis) per the Long-term Care Disability Assessment Standard (Trial). (iii) Primarily received home-based care. (iv) Had normal comprehension with no mental

illness or cognitive impairment. (v) Provided informed consent. Exclusion criteria for disabled elderly individuals: (i) Suffered from severe physical illnesses or extreme debilitation preventing study participation.

Inclusion criteria for caregivers: (i) Aged 18 years or above. (ii) Were relatives bearing the main caregiving responsibility. If multiple caregivers existed, the one with the longest care duration was selected. (iii) Had provided care for over one month. (iv) Had normal comprehension with no mental illness or cognitive impairment. (v) Provided informed consent. Exclusion criteria for caregivers: (i) Paid caregivers.

2.3. DATA COLLECTION

Questionnaires were distributed to eligible disabled elderly individuals and caregivers in the target communities. For participants with reading difficulties, trained investigators read items to participants one-on-one and recorded their responses accordingly. Questionnaires were collected on the spot. Of the 255 questionnaires distributed, 214 valid responses were retained after excluding incomplete or invalid forms, yielding an effective response rate of 83.92%.

2.4. MEASUREMENTS

2.4.1. GENERAL INFORMATION QUESTIONNAIRE

This self-designed questionnaire consisted of forms for disabled elderly individuals and caregivers, covering gender, age, education, monthly per capita family income, and marital status.

2.4.2. CHINESE VERSION OF THE LUBBEN SOCIAL NETWORK SCALE-6

The Chinese version of the Lubben Social Network Scale-6 assessed social support for disabled elderly individuals. Developed by Lubben *et al*.[43] in 1988 and cross-culturally validated, it effectively measures social isolation in the elderly. With 6 items and two dimensions—family network (items 1–3) and friend network (items 4–6)—each item had 6 options, each with a score range from 1 to 6. Total scores ranged from 6 to 36, and higher scores were associated with better social networks. Dimension scores below 6 or a total score below 12 suggest social isolation; scores above 12 indicate a more complete social network, with higher scores reflecting better social network conditions. The English version had a Cronbach's α of 0.83.[43] The Chinese version showed family network structure validity of 0.84–0.91, friend network structure validity of 0.91–0.96, and Cronbach's α of 0.83, reliably evaluating social support in Chinese older adults.[44]

2.4.3. CHINESE VERSION OF THE SOCIAL SUPPORT RATING SCALE

The Chinese version of the Social Support Rating Scale-10 measured social support for caregivers. Compiled by Chinese scholar Xiao[45] in 1986, it had three dimensions: objective support (items 2, 6, 7), subjective support (items 1, 3, 4, 5), and utilization of support (items 8, 9, 10), with 10 items in total. In terms of scoring, items 1–4 and 8–10 were single-choice, with a score range of 1–4; item 5 had a score range of 1–4 based on response levels, with sub-item scores summed; items 6 and 7 were scored 0 for "no source" and by the number of sources mentioned. Total scores ranged from 12 to 66, with higher scores indicating greater social support. A total score ⩽ 22 was considered low, 23–44 as medium, and 45–66 as high. The total scale and dimensions had Cronbach's α coefficients ranging from 0.83 to 0.90.

2.4.4. CHINESE VERSION OF THE DISTRESS THERMOMETER

The Chinese distress thermometer (DT) assessed psychological distress in disabled elderly individuals and caregivers. Developed by Roth in 1998 for cancer patients and caregivers[46], it uses a single item scored 0–10. Scores: 0 for no distress, 1–3 for mild, 4–9 for significant, and 10 for extreme distress. Patients self-rated based on the past week's distress. A score ⩾ 4 indicated clinically significant distress. The Chinese DT showed good validity and performance in older patients and caregivers.[47,48]

2.4.5. CHINESE VERSION OF THE CONNOR–DAVIDSON RESILIENCE SCALE-10

The Chinese version of the Connor–Davidson Resilience Scale-10 evaluated psychological resilience in disabled elderly individuals and caregivers. Developed by Connor and Davidson in 2003[49], it measures positive adaptation to adversity. With a total Cronbach's α of 0.89, it was adapted to Chinese by Wu *et al*.[50] in 2007 and widely used in Chinese cancer patients and their spouses.[51,52] With three dimensions: toughness (13 items), self-reliance (8 items), and optimism (4 items), 25 items in total, it uses a 5-point Likert scale (0–4, from "never" to "always"). Total scores ranged from 0 to 100, with higher scores indicating greater resilience." to"With three dimensions, 25 items in total. We use its simplified version,CD-RISC-10,which uses a 5-point Likert scale (1–5, from "never" to "always"). Total scores ranged from 10 to 50, with higher scores indicating greater resilienc.[53]

2.5. DATA ANALYSIS

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS 26.0, IBM, United States) and Amos (26.0, AMOS Development Corporation, United States). Descriptive statistics using SPSS described demographic and disease-related characteristics, social support, psychological distress, and resilience. Pearson correlation analysis examined variable relationships in elderly–caregiver dyads. Paired sample *t*-tests compared the differences between disabled elderly individuals and caregivers, while independent sample *t*-tests and χ^2 tests assessed differences in demographic and clinical characteristics.

To verify the dyadic effect of social support on psychological distress, Amos was used for APIMeM analysis. Disabled elderly–caregiver dyads were treated as distinct entities with separate variables and effects. Variables included social support and psychological distress levels of the disabled elderly and caregivers, and psychological resilience as a potential mediator. Bootstrap analysis with 5,000 samples provided 95% confidence intervals for mediation effects. Model fit was evaluated using goodness-of-fit indices: χ^2/degree of freedom < 3, root mean square error of approximation ⩽ 0.08, and comparative fit index ⩾ 0.90.[54]

3. RESULTS

3.1. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

A total of 214 dyads of disabled elderly and their caregivers were included in the results. The age ranges were 60–102 years (74.17 ± 8.55 years) and 19–86 years (55.14 ± 15.42 years), respectively. The proportion of disabled elderly women (119, 55.6%) was higher than that of men, while the proportion of male caregivers (112, 52.3%) was higher than that of female caregivers. The majority of disabled elderly and caregivers were married (68.2% of disabled elderly and 88.8% of caregivers). The most common educational level among disabled elderly people was no formal education (illiteracy) (85, 39.7%), while their caregivers' main educational level was primary school (45, 21.0%), followed by a bachelor's degree or above (41, 19.2%). Table 1 summarizes the socio-demographic characteristics of disabled elderly individuals and caregivers.

3.2. COMPARISON OF SOCIAL SUPPORT, PSYCHOLOGICAL DISTRESS, AND PSYCHOLOGICAL RESILIENCE BETWEEN THE ELDERLY AND CAREGIVERS

A paired *t*-test was conducted on the social support, psychological resilience, and psychological distress of disabled elderly and caregivers (Table 2), and standard score conversion was performed on the social support scale. The results showed that the social support level ($t = -11.2$, $p < 0.001$) and psychological resilience ($t = -6.38$, $p < 0.001$) of caregivers were higher than those of disabled elderly people, while the psychological pain level of caregivers was lower than that of disabled elderly people ($t = 5.21$, $p < 0.001$).

3.3. THE CORRELATION BETWEEN SOCIAL SUPPORT, PSYCHOLOGICAL DISTRESS, AND PSYCHOLOGICAL RESILIENCE

Through correlation analysis of social support, psychological distress, and psychological resilience among disabled older adults and their caregivers, the following results were obtained (Table 3). There is a positive correlation between the psychological resilience of disabled elderly and caregivers ($r = 0.408$, $p < 0.01$), their social support ($r = 0.396$, $p < 0.01$), and their psychological pain ($r = 0.477$, $p < 0.01$), indicating a non-independent relationship among them. The social support of disabled elderly is positively correlated with their own psychological resilience ($r = 0.317$, $p < 0.01$), and negatively correlated with their own psychological pain ($r = -0.263$, $p < 0.01$). Psychological pain of disabled elderly is negatively correlated with their psychological resilience ($r = -0.542$, $p < 0.01$). The social support of caregivers is positively correlated with psychological resilience ($r = 0.265$, $p < 0.01$) and negatively correlated with psychological pain ($r = -0.378$, $p < 0.01$). The psychological pain of caregivers is negatively correlated with their psychological resilience ($r = -0.502$, $p < 0.01$).

3.4. ACTOR–PARTNER INTERDEPENDENCE MEDIATION MODEL ANALYSIS

Figure 1 illustrates the interrelationships between social support, psychological resilience, and psychological distress among disabled elderly individuals and their caregivers. The path estimates are shown in Figure 1.

Table 1. Socio-demographic characteristics of disabled elderly–caregiver dyads

Variables	Patients, *n* (%) *n* = 214	Caregivers, *n* (%) *n* = 214
Gender		
Male	95 (44.4)	112 (52.3)
Female	119 (55.6)	102 (47.7)
Age (year)		
19–39	0 (0.0)	43 (20.1)
40–59	0 (0.0)	83 (38.8)
60–69	66 (30.8)	32 (15.0)
70–79	95 (44.4)	46 (21.5)
80–102	53 (24.8)	10 (4.7)
Marital Status		
Unmarried	5 (2.3)	11 (5.1)
Married	146 (68.2)	190 (88.8)
Divorce/separation	10 (4.7)	5 (2.3)
Widowed	53 (24.8)	7 (3.3)
Residential area		
Large cities	/	75 (35.0)
General county and city	/	10 (4.7)
Villages and towns	/	7 (3.3)
Rural area	/	122 (57.0)

(*Cont'd...*)

Table 1. *Continued*

Variables	Patients, *n* (%) *n* = 214	Caregivers, *n* (%) *n* = 214
Residential situation		
Together with children	52 (24.3)	/
Together with spouse	88 (41.1)	/
Together with children and spouse	43 (20.1)	/
Living alone	28 (13.1)	/
Other	3 (1.4)	/
Main types of medical insurance		
New Rural Cooperative Medical Scheme	104 (48.6)	/
Basic Medical Insurance for Urban Residents	59 (27.6)	/
Basic Medical Insurance for Urban Employees	49 (22.9)	/
Self funded	2 (0.9)	/
Employment status		
Unemployed	62 (29.0)	63 (29.4)
Employed	83 (38.8)	112 (52.3)
Retired	69 (32.2)	39 (18.2)
Educational level		
Illiteracy	85 (39.7)	39 (18.2)
Primary school	45 (21.0)	55 (25.7)
Junior high school	45 (21.0)	42 (19.6)
High school	21 (9.8)	20 (9.3)
Junior college	7 (3.3)	17 (7.9)
Bachelor's degree and above	9 (4.2)	41 (19.2)
Monthly expenses for caring for disabled elderly people (CNY)[a]		
100–500	/	56 (26.2)
>CNY 500–1000	/	65 (30.4)
>CNY 1000–3000	/	77 (36.0)
>CNY 3000–7000	/	16 (7.5)

Note: [a]Exchange rate on April 9, 2025: 1 USD = CNY 7.3499.

Table 2. Comparison of social support, psychological resilience, and psychological distress between the disabled elderly and caregivers

Variables	Disabled elderly	Caregiver	*t*	*p*-value
Social support	58.28 ± 15.55	68.85 ± 11.00	−11.2	< 0.001
Resilience	34.67 ± 7.13	37.82 ± 5.94	−6.38	< 0.001
Distress	3.38 ± 2.27	2.64 ± 1.66	5.21	< 0.001

Note: Due to the difference in social support scales between disabled elderly and caregivers, the scores were compared after standard score conversion.

3.4.1. THE ACTOR EFFECT PATHWAY OF SOCIAL SUPPORT ON PSYCHOLOGICAL RESILIENCE AND PSYCHOLOGICAL PAIN

The analysis among disabled older adults revealed that the direct effect of social support on their psychological distress was not significant. However, the direct effect of social support on psychological resilience (Figure 1, $\beta = 0.26$, $p < 0.001$) and the direct effect of psychological resilience on psychological distress (Figure 1, $\beta = -0.47$, $p < 0.001$) were both statistically significant. This indicates that for disabled elderly individuals, social support plays a fully mediating role in influencing psychological distress through psychological resilience.

Comparative analysis of caregivers identified that social support has a significant direct effect on their psychological distress (Figure 1, $\beta = -0.21$, $p < 0.001$); it also has a significant direct effect on psychological resilience (Figure 1, $\beta = 0.25$, $p < 0.001$). The caregivers' psychological resilience has a significant direct effect on psychological distress (Figure 1, $\beta = -0.40$, $p < 0.001$). Therefore, for caregivers, social support partially mediates psychological distress through psychological resilience.

Table 3. Inter-correlations, means, and standard deviations of the study variables for disabled elderly-caregiver dyads (*n* = 214)

Variables	M	SD	Disabled elderly			Caregiver		
			Resilience	Social support	Distress	Resilience	Social support	Distress
Resilience–elderly	34.67	7.13	1					
Social support–elderly	20.91	5.64	0.317**	1				
Distress–elderly	3.38	2.27	−0.542**	−0.263**	1			
Resilience–caregiver	37.82	5.94	0.408**	0.139*	−0.277**	1		
Social support–caregiver	46.08	7.31	0.245**	0.396**	−0.297**	0.265**	1	
Distress–caregiver	2.64	1.66	−0.322**	−0.264**	0.477**	−0.502**	−0.378**	1

Notes: *$p < 0.05$; **$p < 0.01$. Abbreviations: M: Mean; SD: Standard deviation.

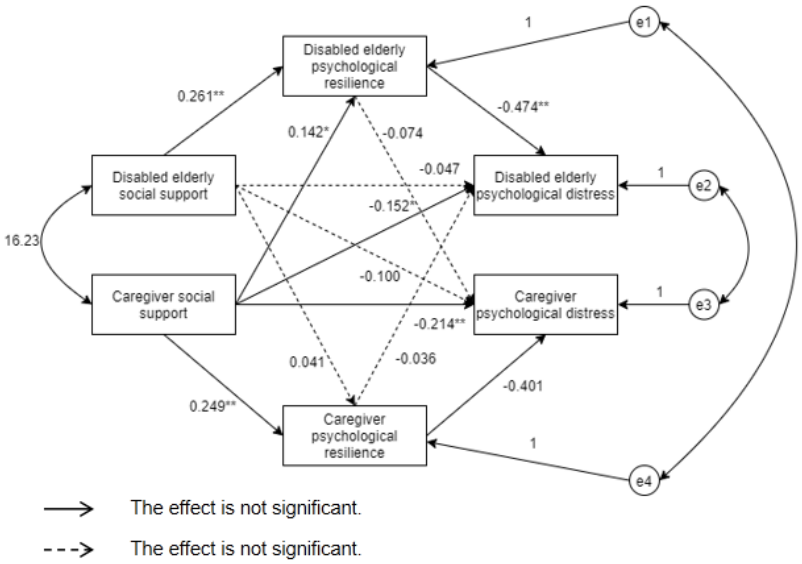

Figure 1. The actor–partner interdependence model extended to the mediation model of psychological resilience as a mediator of social support and psychological distress for disabled elderly and caregivers' dyads
Notes: *$p < 0.05$; **$p < 0.01$.

3.4.2. THE PARTNER EFFECT PATHWAY OF SOCIAL SUPPORT ON PSYCHOLOGICAL RESILIENCE AND PSYCHOLOGICAL PAIN

The results show that caregivers' social support had a significant partner effect on the psychological resilience of disabled elderly people (β = 0.14, $p < 0.05$) and on their psychological pain. This indicates that social support from caregivers can have a positive impact on the psychological resilience of disabled elderly people, thereby improving their psychological distress.

However, there were no significant partner effects on social support and psychological resilience of disabled elderly compared to caregivers. This shows that providing social support for disabled elderly individuals may not be able to effectively and positively affect the psychological resilience of caregivers or negatively affect their psychological distress.

4. DISCUSSION

Through the actor–partner interdependence mediation model, we examined the interaction mediating role of psychological resilience in the association between social support and psychological distress among disabled older adults and their family caregivers. The findings contribute empirical evidence to inform the design of dyadic intervention strategies aimed at alleviating psychological distress in both members of the dyad.

4.1. LEVELS AND DIFFERENCES IN SOCIAL SUPPORT, PSYCHOLOGICAL RESILIENCE, AND PSYCHOLOGICAL DISTRESS AMONG DISABLED ELDERLY INDIVIDUALS AND CAREGIVERS

Our study reveals that the social support scores of disabled elderly individuals and their caregivers are at a moderate level, with the disabled elderly scoring significantly lower than their caregivers. The results for the disabled elderly align with findings from studies on social support levels for disabled elderly individuals in Beijing[55], and the lower social support levels reflect the insufficient economic assistance and social resource provision for this group in China. Additionally, our study indicates that the social support levels of caregivers are significantly lower than those reported by Yamashita *et al*.[56] for caregivers in São Paulo, particularly in emotional support. This cross-cultural difference may stem from the implicit nature of interpersonal relationships in China, where family members often convey support through actions rather than verbal expressions.[57] This indirect interaction may cause vague perceptions of

support, leading to inadequate emotional expression and thereby affecting caregivers' perception of social support. From the perspective of external family factors, Chinese people tend to interact less proactively with strangers.[58] The limitations in social interaction make it challenging for caregivers to seek external support. In an environment lacking direct communication, caregivers find it difficult to identify reliable social support networks, further intensifying their sense of isolation and helplessness. These findings indicate that in devising intervention strategies, emphasis should be placed on cultivating emotional expression skills among family members and enhancing the connection between family units and society. Establishing accessible channels for social support is crucial.

Regarding psychological resilience, the disabled elderly in our study showed a moderate level, slightly higher than that reported by Cai *et al*.[59] among the disabled elderly in Shanghai public nursing homes. This may be due to the fact that the disabled elderly in this study lived at home with milder disabilities. In addition, caregivers in our study had higher psychological resilience than family caregivers of dementia patients reported by Hui *et al*.[60] (mean ± standard deviation = 24.83 ± 7.58). This difference might result from the relatively lower degree of disability and the caregiving pressure faced by caregivers in our study. Dementia patients' weak self-care ability can be more energy-draining and require more patience from caregivers, thus weakening their psychological resilience. Moreover, the disabled elderly scored significantly lower than caregivers, which might be linked to the multiple stressors from chronic diseases.[61] The long-term physical functional limitations of disabled elderly individuals may trigger a sense of self-efficacy depletion, thereby undermining their psychological adaptability.

In terms of psychological distress, both the disabled elderly and their caregivers exhibited low levels of distress (mean ± standard deviation = 3.38 ± 2.27 and 2.64 ± 1.66, $t = 5.21$). Most elderly participants in our study were from urban areas, avoiding the structural disadvantages, such as scarce educational resources and insufficient medical security, prevalent in rural China.[56,62] Thus, compared to the data on rural elderly individuals in China reported by Feng *et al*.[62] (29.3% of participants had moderate or severe psychological distress), the psychological distress in our study was milder. However, the disabled elderly had a higher overall level of psychological distress than caregivers, similar to a Vietnamese study.[63] This may be due to the pain, inconvenience, social isolation, and reduced sense of value caused by physical illnesses and functional limitations in disabled elderly individuals.[64] In contrast, caregivers had a lower disease burden, stronger psychological adjustment, and could derive a sense of achievement and purpose from caregiving.[63] Therefore, their psychological distress was relatively lower than that of the disabled elderly.

4.2. CORRELATIONS AMONG SOCIAL SUPPORT, PSYCHOLOGICAL RESILIENCE, AND PSYCHOLOGICAL DISTRESS IN DISABLED ELDERLY INDIVIDUALS AND CAREGIVERS

We found that social support, psychological resilience, and psychological distress of disabled elderly individuals can positively and significantly impact those factors in caregivers, which is in line with previous studies.[65-67] This indicates a notable covariation in social support perception and psychological states within the disabled elderly–caregiver dyadic system. This dynamic interaction can be explained by the Dyadic Coping Model.[68] When disabled elderly individuals and caregivers form an effective emotional support link and handle life stress together, their psychological resilience improves, and their psychological distress decreases, with this effect being mutually reinforced by emotional contagion and behavioral reinforcement. This further highlights the interdependence among social support, psychological resilience, and psychological distress in both groups. Thus, enhancing social support and psychological resilience for both parties can reduce psychological distress and improve quality of life. Consequently, in designing interventions, it is crucial to offer comprehensive support for disabled elderly individuals and caregivers to boost their psychological outcomes and overall well-being.

4.3. EFFECTS OF SOCIAL SUPPORT, PSYCHOLOGICAL RESILIENCE, AND PSYCHOLOGICAL DISTRESS ON INDIVIDUALS

In our study, we observed that social support for both disabled elderly individuals and caregivers can positively affect their psychological resilience, thereby alleviating psychological distress, consistent with previous studies.[69,70] Psychological resilience of the disabled elderly fully mediates the association between social support and psychological distress, while caregivers' social support can directly impact psychological distress and also affect it indirectly through psychological resilience. Thus, the results show that when the disabled elderly and caregivers face long-term caregiving stress, social support has a main effect (directly easing psychological distress) and a buffering effect (relieving psychological distress by enhancing psychological resilience).[71,72]

Social support can boost personal adaptability, form secure attachment relationships, and enhance self-efficacy.[73] For the disabled elderly who are partially or fully dependent in daily life and have less social participation and emotional experiences, good social support can cushion the impact. The higher the social support level, the more abundant the external resources, the stronger the elderly's ability to resist the stress of disability (i.e., psychological resilience), and the less the psychological distress caused by disability, forming a positive feedback loop.[74]

For caregivers, the psychological and emotional support, information and knowledge support, and medical service guarantees they get from third parties in daily life and work can help relieve and resolve the long-term caregiving burden. This makes caregivers more proactive in seeking social resources and peer relationships, helps them actively cope with and regulate negative emotions in caregiving, reduces their psychological distress, effectively replenishes their psychological energy, and maintains the balance between contribution and gain mentioned in Walster's equity theory.[75] This shows that improving social support for the disabled elderly and caregivers and intervening in their psychological resilience is key to reducing their psychological distress.

4.4. EFFECTS OF SOCIAL SUPPORT, PSYCHOLOGICAL RESILIENCE, AND PSYCHOLOGICAL DISTRESS ON CAREGIVERS

This study reveals an asymmetric influence relationship. An increase in caregivers' social support significantly enhances

the psychological resilience of the disabled elderly and reduces their psychological distress. However, the disabled elderly's partner effect is not significant. The partner effect of the caregivers is more evident. This aligns with the Stress-Buffering Model. The model holds that social support can reduce caregivers' helplessness and loneliness by offering emotional comfort, practical help, and information resources.[33] George *et al*.'s[76] study shows that when caregivers' social support rises, their psychological distress drops significantly. The positive emotions from caregivers' social support can be passed to the elderly through facial expressions and tones. Furthermore, caregivers' mental fortitude and caregiving ability improve, positively impacting their caregiving behavior. In daily interactions with the elderly, caregivers can provide better practical care and pay closer attention to the elderly's emotional experiences. They can offer a strong emotional support, promote family harmony, and enhance family members' self- and behavioral awareness. This makes the elderly perceive the family's cohesion in facing setbacks, generating happiness, and improving their negative emotions like guilt, pain, and anxiety.[77] Therefore, in future community-based work, we should focus on rebuilding caregivers' social support networks to alleviate the psychological distress of both the elderly and caregivers.

Moreover, caregivers' social support level can influence the elderly's psychological distress by affecting their psychological resilience, showing a partner-mediated effect. From the Resource Conservation Theory perspective[78], in long-term care situations, caregivers, as the main resource providers, have their resource reserves of materials and emotions directly influenced by the quality of their social support networks. When caregivers receive sufficient social support, they can pass on positive emotions and cognitive resources to disabled older adults through the resource spillover effect, thereby strengthening the latter's psychological resilience. Conversely, due to functional limitations, the disabled elderly's social support system is mostly passive reception rather than active provision. This one-way resource dependence makes it difficult for their support level to effectively supplement caregivers' psychological resources.

4.5. RESEARCH IMPLICATIONS

This study reveals a key limitation of traditional intervention programs: the prevailing individual-based approach, which typically targets either the disabled elderly individual or the caregiver in isolation, fails to capture the deeply interdependent dynamics of their long-term care relationship. By overlooking the reciprocal influences—where improvements in one party's psychological state, social support, or coping resources directly affect the other—these interventions miss opportunities for amplified positive outcomes. In contrast, the findings of the present study strongly support a shift toward a dyadic perspective and the adoption of a family-system-based intervention model. This approach treats the caregiver–elderly dyad as an interactive unit, enabling rapid transmission of benefits: when one party experiences reduced psychological distress or enhanced social support, these gains generate positive feedback that strongly benefits the other, creating a virtuous cycle of mutual reinforcement and resource sharing.

Based on these findings, the following intervention suggestions are proposed. Each deliberately departs from isolated individual-focused strategies in favor of integrated, dyadic, and systemic supports:

(i) Reconsider the individual-based approach by establishing a comprehensive social support network that encompasses both disabled elderly individuals and their caregivers. Traditional interventions often target only one party, neglecting the relational interdependence highlighted in this study. To address this gap, neighborhood committees and community health service centers should collaborate to establish caregivers' associations for families of disabled elderly individuals in community public spaces. These associations would provide dedicated venues and channels for families to connect, thereby fostering mutual support among neighbors, the broader community, disabled elderly individuals, and caregivers. Concurrently, aging-friendly day care centers should be developed to offer centralized daytime care for disabled elderly individuals within the community. Such centers would better meet the elderly's social interaction needs, provide higher-quality care, and afford caregivers sufficient personal time to alleviate stress and prevent burnout.

(ii) Prioritize psychological resilience-based interventions delivered through shared community networks and explicitly targeting both parties in the dyad. The present study shows that psychological resilience significantly mediates the relationship between social support and psychological distress, with spillover effects between elderly individuals and caregivers. Rather than providing resilience training to individuals in isolation, evidence-based interventions should be embedded in community support systems that involve both parties. For example, regularly inviting psychological experts or trained nursing staff to deliver lectures, workshops, and joint social activities can simultaneously reduce negative emotions and strengthen resilience in both disabled elderly individuals and caregivers.

(iii) Strengthen targeted support for caregivers, recognizing their substantial indirect influence on the psychological well-being of disabled elderly individuals. The study demonstrates that enhancing caregivers' social support and psychological resilience yields significant spillover benefits that alleviate the elderly's distress—effects that individual-based programs typically overlook. However, in China, caregiver-focused interventions remain largely neglected, a situation exacerbated by the culturally prevalent "leading-by-action" emotional communication style, which can impede emotional perception and expression within the dyad. The government should therefore integrate resources and implement supportive policies, including care subsidies, smart monitoring systems, and volunteer shift-taking programs to lighten caregivers' burdens. At the same time, free training in nursing skills and widespread dissemination of psychological knowledge should be offered to bolster caregivers' capabilities, foster positive emotional interactions and improved communication with the elderly, and ultimately enhance the elderly's psychological well-being through the caregivers' strengthened capacity.

4.6. LIMITATIONS

In this study, we recruited participants from specific Shanghai communities, limiting the generalizability of the findings. The cross-sectional data collection precludes understanding the dynamic relationships among social support, psychological resilience, and psychological distress

in daily life. Additionally, the self-report data collection method may be subject to social desirability and recall bias[79], potentially affecting data accuracy.

5. CONCLUSION

Based on the actor-partner interdependence mediation model, we examined the mediating role of psychological resilience between social support and psychological distress in disabled elderly individuals and caregivers in China. The findings revealed significant individual effects: social support positively influenced psychological resilience, whereas psychological distress was negatively affected. Moreover, caregiver social support positively impacted disabled elderly individuals' psychological resilience, producing a significant partner effect on their psychological distress. These results, situated within China's cultural emphasis on filial piety and family-based caregiving amid rapid population aging, indicate that clinical interventions should move beyond individual-focused approaches. Instead, strategies should be developed at the dyadic interaction level, integrated with China's growing community-based elderly care systems.

On one hand, strengthening community support networks, such as those facilitated by local neighborhood committees and community health service centers, along with group-based interventions incorporating traditional practices like Tai Chi or mindfulness activities, can simultaneously alleviate psychological distress in both disabled elderly individuals and their caregivers, aligning with national policies promoting home- and community-embedded care.

On the other hand, empowering caregivers through targeted support, such as government-subsidized caregiver training and social support programs under China's basic elderly care initiatives, can indirectly alleviate psychological distress among disabled elderly individuals by enhancing their social support and psychological resilience. This caregiver-centered approach not only respects filial piety traditions but also reduces the care burden on caregivers in the 4-2-1 family structure affected by the Chinese one-child policy, ultimately improving mental health for both parties through culturally attuned, community-integrated care.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

AUTHOR CONTRIBUTIONS

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval for this study was obtained from the Ethics Committee of the School of Nursing, Fudan University (approval number: IRB#TYSQ20200427). Written informed consent was obtained from both disabled elderly individuals and their caregivers prior to the survey.

CONSENT FOR PUBLICATION

All participants provided informed consent for the publication of the findings derived from this study. Where applicable, participants gave explicit permission for the publication of any data, images, or information that could potentially reveal their identity. The authors affirm that all relevant consent forms have been obtained and are available upon request.

DATA AVAILABILITY STATEMENT

Data are not openly available. Data are available upon request from corresponding author.

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