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# ORIGINAL RESEARCH

# Effects of Social Support Provided by Disabled Older Adults to Others on Their Own Depressive Symptoms: A Moderated Mediation Model

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**Purpose:** While previous studies have extensively examined the impact of receiving positive social support during social support interactions on depressive symptoms among older adults, adverse effects experienced, such as being rejected or ignored, are often overlooked. Moreover, there has been limited discussion on the effects of giving social support to others. Thus, this study investigates the impacts of social support given by disabled older adults to others on their own depressive symptoms, as well as the mediating role of receiving social support (both positive and negative aspects) and the moderating effect of the activity of daily living (ADL).

**Patients and Methods:** This cross-sectional, community-based study was conducted in Wenzhou and Jiaxing City, China, from September 2021 to September 2022, with a total of 255 disabled older adults meeting the inclusion and exclusion criteria. The data were collected face-to-face using a structured questionnaire. The participants were asked to complete the Barthel Index Scale, the Chinese version of the Positive and Negative Social Exchange Scale, the Giving Social Support questionnaire, and the Short Form Chinese Geriatric Depression Scale to measure disability, receiving positive and negative social support, giving social support, and depressive symptoms, respectively. Descriptive statistical analysis, correlation analysis, mediation effect tests, and moderation effect tests were used to analyse the questionnaire data.

**Results:** The social support provided by disabled older adults to others primarily involved companionship and care. The positive aspect of social support received was largely emotional support, while the negative aspect was mainly characterised by failure to obtain help and unsympathetic behaviour. Providing social support was found to be associated with a potential beneficial effect on depressive symptoms, linked to lower severity, with this effect fully mediated by receiving social support. Specifically, receiving emotional support accounted for 56.63% of the effect size, while failure to obtain help and unsympathetic behaviour contributed 21.55%, and rejection and neglect collectively accounted for 21.83%. Additionally, the effect was partially moderated by ADL, with older adults exhibiting lower ADL scores showing a greater benefit from both giving and receiving social support compared to those with higher ADL scores.

**Conclusion:** It is imperative to recognise and encourage disabled older adults to provide social support to others, especially emotional support, while reducing negative feedback, such as neglect and unnecessary blame. This could alleviate their depressive symptoms and promote psycho-social well-being.

Keywords: disabled older adults, social support, social exchange, depressive symptoms, ADL

### Introduction

Managing ageing societies has become a pressing concern globally. In 2022, China's population aged 60 and above reached 280 million, accounting for 19.8% of the total population.<sup>1</sup> With the growing older adult population, the number

of disabled older adults is also steadily increasing. The disability rate among older adults in China is projected to remain at approximately 10% in the foreseeable future.<sup>2</sup>

Compared with healthy older adults, disabled older adults are more likely to experience depressive symptoms.<sup>3</sup> Especially, older adults with visual or speech disabilities or impairments in activities of daily living are at higher risk for major depressive disorders.<sup>4,5</sup> According to the 2013 China Health and Retirement Longitudinal Study (CHARLS), the prevalence of depressive symptoms in disabled older adults was 46.1%, compared with 31.2% among older adults in general.<sup>6,7</sup> Depressive symptoms in older adults are often mistakenly considered an unavoidable aspect of ageing, leading to frequent neglect of their adverse effects.<sup>8</sup> Notably, depressive symptoms can contribute to a range of negative outcomes, including physical frailty, cognitive decline, and suicide.<sup>9–11</sup> Therefore, it is imperative to identify depressive symptoms among disabled older adults to provide appropriate guidance and interventions, thereby enhancing their overall physical and mental well-being.

Social support refers to the spiritual or material help, care, and respect provided by family, relatives, friends, and social institutions such as schools, groups, and communities.<sup>12</sup> Low levels of social support can foster feelings of alienation, increasing the risk of depressive symptoms and adversely affecting the health of older adults.<sup>13</sup> Current research on social support for older adults, especially those with disabilities, has primarily focused on social support received by these individuals, who are often seen as passive recipients due to their health conditions or limitations. However, research has shown that for the non-disabled older adult population, giving social support to others is as important as receiving it, as it significantly benefits their well-being.<sup>14,15</sup> Guo et al showed that older adults actively engaged in activities such as volunteering and paid work, thereby providing social support to others and realising their self-worth, were less likely to experience depressive symptoms.<sup>16</sup> Furthermore, from the perspective of equity theory, receiving more social support than one gives can lead to feelings of distress and guilt, while excessive acceptance of social support can diminish older adults' sense of competence and identity.<sup>17,18</sup> Although disabled older adults may struggle to balance the social support they receive with what they give due to declining physical function, this does not mean they do not need to offer social support to others, and, similar to the general older adult population, this support may positively impact their mental health and reduce depressive symptoms. This leads to the first hypothesis of this study:

H1: Giving social support to others is significantly and inversely associated with depressive symptoms in disabled older adults.

Social exchange theory posits that interpersonal interactions are reciprocal.<sup>15,18</sup> The more social support one gives, the more one receives. However, for disabled older adults, who are often perceived as recipients of care, does the limited or absence of social support they provide to others affect the social support they receive? Moreover, does this, in turn, affect their depressive symptoms through the positive social support they receive? These questions have not been thoroughly examined in existing literature. Moreover, engaging in social exchanges can involve not only positive social support but also negative exchanges, leading to negative social support.<sup>20</sup> Negative social support goes beyond the mere absence of positive support or social isolation; it refers to interactions or instances where the provider fails to meet the recipient's expectations. This can manifest as excessive demands, rejection, or being ignored.<sup>21</sup> The potential impact of the social support that disabled older adults provide on subsequent negative exchanges and how this affects their depressive symptoms remains unexplored.

While positive social support obtained through positive social interactions has been shown to alleviate depressive symptoms in older adults,<sup>22,23</sup> negative social support, which induces emotional distress, can have a more pronounced effect on depressive symptoms than positive social interactions, and is a more significant indicator of depressive symptoms in older adults.<sup>24</sup> Based on this, we hypothesise that the social support given by disabled older adults to others would influence their social interaction processes, including the type of support they receive (positive or negative) and, consequently, their depressive symptoms levels. This leads to Hypothesis 2 of this study:

H2: Social support (both positive and negative) received by disabled older adults mediates the relationship between the social support they give to others and depressive symptoms.

Previous studies have shown that mildly and moderately disabled older adults retain the capability to perform basic daily living activities and even engage in light physical activities such as organising wardrobes and cleaning.<sup>25</sup> In contrast, severely disabled older adults experience greater limitations in performing activities of daily living (ADL) and rely heavily on others.<sup>26</sup> Therefore, it is hypothesised that there will be differences in the social support given and received by older adults with varying ADL abilities. This leads to Hypothesis 3 of this study:

H3: The ability to perform ADL moderates the relationship between giving and receiving social support.

In summary, despite declines in physical functioning, disabled older adults can still provide some social support to others. However, few studies have explored this aspect or the relationship between social support given by disabled older adults and depressive symptoms. Based on social exchange theory and related research, we hypothesise that disabled older adults will provide social support to the best of their abilities in exchange for receiving social support, thereby alleviating their internal burdens and frustrations and maintaining their psychological well-being, such as relieving depressive symptoms. While previous studies have examined the relationship between social support given and received and the well-being of older adults,<sup>15,27</sup> they often exclude negative interactions. Therefore, the present study considers negative interactions in constructing the hypothesised model, as depicted in Figure 1. This study aims to investigate how social support given by disabled older adults affects the social support they receive (both positive and negative), how this received support affects their depressive symptoms, and the moderating role of their ability to perform ADL. Understanding these factors will provide a basis for developing a home care intervention programme to reduce depressive symptoms among disabled older adults, ultimately benefiting both the disabled older adults and their caregivers.

### Materials and Methods Sample

The study was conducted in 16 communities across Zhejiang Province, China, between September 2021 and September 2022: Jiaxing City (ten communities, four urban and six rural areas) and Wenzhou City (six communities, three urban and three rural areas). Due to the COVID-19 pandemic coinciding with the survey period, convenience sampling was used to select communities based on their pandemic control situations. Within the selected communities, whole-cluster sampling was used to select the disabled older adults. The inclusion criteria were: (1) age  $\geq$ 60 years old; (2) inability to live independently and requiring assistance with daily living activities (eg, difficulty using stairs or bathing independently, with a Barthel Index score <100) for  $\geq$ 3 months (excluding those requiring care for short-term illnesses); and (3) being conscious and capable of understanding and answering questions. The exclusion criteria were: (1) being



Figure I Hypothesised moderated mediation model.

unable to communicate due to severe hearing impairment or other serious illnesses that made survey completion difficult, and (2) being diagnosed with mental illnesses other than depression.

The researchers comprised seven graduate students and five undergraduate students from the School of Nursing at Wenzhou Medical University. All researchers received standardised training before the study began. For the disabled older adults in the community with limited mobility, interviews were conducted as household surveys with the consent of the older adults and their caregivers (or guardians) and under the supervision of community staff members. The disabled older adults capable of outdoor activities were recruited by the community, accompanied by their caregivers, and gathered at a designated place (the activity centre for the older adults) for interviews. All investigations were conducted face-to-face, and questionnaires were collected on-site. Previous literature suggests a sample size range of 221 to 1000 for a multi-step mediation model.<sup>28</sup> In this study, a total of 302 questionnaires were distributed. To ensure data integrity and the precision of analytical outcomes, we implemented rigorous data cleaning measures, specifically excluding 47 questionnaires with incomplete information on primary variables. Specially, 20 participants withdrew during the process, and 27 questionnaires were deemed incomplete (with an effective completion rate below 80%). Ultimately, 255 valid questionnaires were collected, resulting in an effective response rate of 84%.

### **Measures**

### Barthel Index (BI)

The Barthel Index (BI) was used to measure the daily living abilities of older adults.<sup>29</sup> The scale comprises 10 items assessing functions such as eating, bathing, grooming, dressing, bowel and bladder control, toileting, bed and chair transfers, walking 45 metres on level ground, and walking up and down stairs. The total score ranges from 0 to 100, with higher scores indicating better daily living abilities. Participants were classified according to their level of dependence: no dependence (100 points), mild dependence (61–99 points), moderate dependence (41–60 points), and severe dependence ( $\leq$ 40 points).<sup>30</sup> The Cronbach's alpha for the scale in this study was 0.894, suggesting satisfactory reliability.

### Chinese Version of the Positive and Negative Social Exchange Scale (PANSE)

The Positive and Negative Social Exchange Scale (PANSE), originally developed by Newsom et al in 2005, was used to assess social support among older adults.<sup>24</sup> This scale, previously translated into Chinese, consists of two subscales—the positive and negative social exchange subscales.<sup>31</sup> The positive social exchange subscale measures the frequency of receiving positive social support within the past month across three dimensions: information support, instrumental support, and emotional support, with a total of 11 items. The negative social exchange subscale measures the frequency of negative social exchanges (ie, negative social support) received in the past month across three dimensions: unwanted advice or intrusion, failure to obtain help and unsympathetic behaviour, and rejection or neglect, with a total of 10 items. Both subscales use a 5-point Likert scale, where participants rate each item as "0=never", "1=seldom", "2=sometime-s"", 3=often", and "4=always". The total score ranges from 0–44 and 0–40, respectively, with higher scores indicating more social support received. In this study, Cronbach's alpha for the positive and negative social exchange scales was 0.798 and 0.852, respectively.

### Giving Social Support Questionnaire

The giving social support questionnaire was adapted from the positive social exchange subscale and drew from Brown's measure of giving social support.<sup>32</sup> This study assessed the frequency with which disabled older adults provided social support to others in the previous month. The questionnaire included four questions on information support, instrumental support, companionship support, and emotional support. Respondents were asked the following questions: (1) How often have you helped others with ideas within the past month? (2) How often have you helped others with doing something or with possessions within the past month? (3) How often have you accompanied others within the past month? and (4) How often have you cared for or comforted others within the past month?. Participants rated each item on a 5-point Likert scale, with "0=never", "1=seldom", "2=sometimes", "3=often", and "4=always". The total score ranged from 0 to 16, with higher scores indicating greater social support given to others. The Cronbach's alpha for this questionnaire was 0.620, which is within the acceptable range (greater than 0.600).<sup>33</sup>

### Short Form Chinese Geriatric Depression Scale (GDS-15)

The Geriatric Depression Scale, developed by Yesavage et al, was used to evaluate depressive symptoms in older adults by asking respondents how they felt about their living situation during the past week. Participants responded with "yes" or "no" (yes=1, no=0) for each item. The scale has a total possible score of 15,<sup>34</sup> with higher scores indicating more severe depressive symptoms and scores of  $\geq 5$  indicating depressive symptoms.<sup>35</sup> In this study, the Cronbach's alpha for this scale was 0.911.

### **Control Variables**

The control variables included gender, age, education level, marital status, religion, disability duration, monthly household income, and health status (eg, number of chronic diseases).

### Statistical Analysis

All data analyses were performed using IBM SPSS 23.0 and AMOS 24.0. Descriptive statistics were used to analyse basic interviewee information. Normally distributed data were presented as mean and standard deviation (SD), while for data that did not conform to a normal distribution, continuous variables were expressed as medians with 25th and 75th percentiles (P25, P75). Categorical variables were expressed as counts and proportions (%). Pearson correlation analysis was used to examine associations between variables. Additionally, all variables were assessed for potential multi-collinearity before their inclusion in the multivariable model. Furthermore, mediation and moderation analysis were performed using the SPSS PROCESS macro, version 3.5, developed by Hayes.<sup>36</sup> These analyses used a 95% confidence interval (CI) and 5000 bootstraps. In cases where a statistically significant interaction term was observed, simple slope analyses (pick-A-point method) were performed to demonstrate the moderating role.

Moreover, the maximum likelihood method was used for model fit (ie, the degree of agreement between the hypothesized theoretical model and actual data) and correction. Model fit indices such as chi-square/degrees of freedom ( $\chi^2$ /df), Normed Fit Index (NFI), Incremental Fit Index (IFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Goodnessof-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and Root Mean Square Error of Approximation (RMSEA) are utilized to assess the alignment between the theoretical model and the empirical data. Specifically,  $\chi^2$ /df, NFI, IFI, TLI, and CFI indicate the degree of discrepancy between the hypothesized theoretical model and the actual model, while GFI and AGFI measure the proportion of variance in the observed data that is explained by the theoretical model. RMSEA evaluates the fit between the hypothesized model and a saturated model. A model is considered to exhibit a good fit if the following criteria are satisfied:  $\chi^2$ /df < 3, GFI, AGFI, NFI, IFI, TLI, and CFI > 0.90, and RMSEA < 0.08.<sup>37</sup> Additionally, some scholars regard the following standards as acceptable: AGFI, NFI, IFI, TLI, and CFI > 0.80.<sup>38-41</sup>

The results were considered significant when the CI did not include 0. Unless otherwise stated, all statistical analyses were performed at a significance level of 0.05 (two-tailed tests).

# Results

### Sample Characteristics and Correlation results

Table 1 presents a summary of the sample characteristics. The average age of respondents was 80.99 years (SD=8.83). More than half were female, had received primary education or less, had at least two children, and most were mildly dependent in their activities of daily living.

For the 255 disabled older adult participants, the mean GDS-15 score was 6.66 (SD=4.86). Of these participants, 135 (52.94%) had GDS scores  $\geq$ 5, indicating clinically depressive symptoms. The mean PANSE score for total positive social support was 23.19 (SD=6.64), while the mean total negative social support score was 10.04 (SD=7.35). The mean score for giving social support to others was 6.14 (SD=2.67). The highest score was for giving companionship (M=2.98, SD=0.95), followed by emotional support (M=2.21, SD=1.11), information support (M=0.53, SD=0.91), and the lowest score was for giving instrumental support (doing something or providing financial assistance) (M=0.42, SD=0.94).

Pearson correlation analysis analysed the relationships between giving social support, receiving social support, and depressive symptoms. As shown in Table 2, correlations were found between the variables in the hypothesised mediation

Variables		n(%)		GDS	
			M (SD)	t/F	Р
Gender	Male	107(41.96)	6.37(4.87)	$-0.807^{a}$	0.420
	Female	148(58.04)	6.87(4.86)		
Age (Years)	60–69	33(12.94)	6.61 (4.42)	0.187 <sup>b</sup>	0.830
	70–79	64(25.10)	6.36(4.68)		
	≥80	158(61.96)	6.80(5.03)		
Education level	Elementary school or less	168(65.88)	6.82(4.82)	0.601 <sup>b</sup>	0.549
	Middle school	44(17.25)	5.93(4.73)		
	High school or higher	43(16.86)	6.79(5.16)		
Religion	No	169(66.27)	6.75(4.97)	0.408 <sup>a</sup>	0.683
	Yes	86(33.73)	6.49(4.66)		
Marital status	Married	153(60.00)	6.50(4.71)	$-0.658^{a}$	0.505
	Non-married	102(40.00)	6.91 (5.08)		
Number of living children	≤	56(21.96)	7.75(5.21)	2.263 <sup>b</sup>	0.106
	2–3	141(55.29)	6.15(4.68)		
	≥4	58(22.75)	6.86(4.84)		
Monthly household income (Yuan)	≤2000	70(27.45)	7.96(4.77)	4.357 <sup>b</sup>	0.014*
	2000–4000	97(38.04)	6.61 (4.83)		
	>4000	88(34.51)	5.69(4.78)		
Number of chronic diseases	≤	39(15.29)	6.08(4.72)	0.909 <sup>b</sup>	0.404
	24	182(71.37)	6.62(4.85)		
	≥5	34(13.33)	7.59(5.09)		
Disability duration (Years)	≤	37(14.51)	7.41 (5.28)	1.093 <sup>b</sup>	0.337
	I5	124(48.63)	6.85(5.12)		
	≥5	94(36.86)	6.13(4.30)		
Level of ADL	Mild dependence	191(74.90)	5.21 (4.27)	55.501 <sup>b</sup>	<0.001***
	Moderate dependence	33(12.94)	9.18(3.55)		
	Severe dependence	31(12.16)	12.94(3.10)		

	Table I	Distribution	and Differences	of GDS Scor	es by Demo	ographic and	Health C	Characteristics (	n=255)
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Notes: t / a, values of t-Test; F / b, values of ANOVA. \*p<0.05, \*\*\*p<0.001.

Abbreviations: M, mean; SD, standard deviation.

Table 2 M	eans, Standard	Deviations, and	Correlations	Among Main	Variables of	f the Study	(n=255)
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Variables	M±SD	I	2	3	4	5	6	7	8
I.GDS	6.66±4.86	-							
2.Giving social support	6.14±2.67	-0.328**	-						
3.Receiving information support	5.35±2.73	-0.146*	0.358**	-					
4.Receiving instrumental support	5.94±1.45	0.173**	0.012	0.247**	-				
5.Receiving emotional support	11.9±4.38	-0.368**	0.609**	0.519**	0.077	-			
6.Unwanted advice or intrusion	2.24±2.47	0.017	0.183**	0.292**	0.159*	0.152*	-		
7.Failure to obtain help and unsympathetic	6.16±4.69	0.394**	-0.289**	-0.230**	0.218**	-0.386**	0.088	-	
behavior									
8.Rejection or neglect	1.64±2.68	0.386**	-0.217**	-0.166**	0.077	-0.295**	0.243**	0.536**	-

Notes: Correlation matrix based on pairwise deletion. M, mean; SD, standard deviation. p<0.05, p<0.01.

pathways (p<0.05), except for the absence of correlations between the GDS and the unwanted advice or intrusion dimension, as well as between the instrumental support dimension in giving and receiving positive social support (p>0.05).

### Hypotheses Testing

### Mediation Effect Analyses

First, to minimise multicollinearity, variables with a variance inflation factor (VIF) below ten were confirmed, ranging from 1 to 2.1 in this study. Subsequently, Model 4 in the PROCESS macro was used to test the mediation model, with receiving social support serving as the mediator while controlling for covariates. The results, presented in Table 3 and Figure 2, indicate that giving social support was significantly and directly associated with receiving information support ( $\beta$ =0.355, p<0.001) and emotional support ( $\beta$ =0.964, p<0.001). On the other hand, giving social support was significantly and inversely associated with failure to obtain help and unsympathetic behaviour ( $\beta$ =-0.414, p<0.001), as well as rejection or neglect ( $\beta$ =-0.217, p=0.002). Receiving informational support was not significantly related to depressive symptoms ( $\beta$ =-0.213, p=0.016). In contrast, failure to obtain help, unsympathetic behaviour ( $\beta$ =0.190, p=0.008), and rejecting or ignoring ( $\beta$ =0.362, p=0.003) were significantly and directly associated with depressive symptoms. Finally, the direct effect of giving social support on depressive symptoms was not statistically significant ( $\beta$ =-0.243, p=0.072). Therefore, we can conclude that hypothesis 1 does not hold in this study.

The bootstrap method was used to test the significance of different pathways. As shown in Table 4, giving social support through receiving emotional support ( $\beta$ =-0.205, 95% CI [-0.392,-0.039]), failure to obtain help and unsympathetic behaviour ( $\beta$ =-0.078, 95% CI [-0.159,-0.016]), and rejection or neglect ( $\beta$ =-0.079, 95% CI [-0.160,-0.019]) reached statistically significant levels, indicating indirect effects on depressive symptoms. In contrast, providing social support through receiving information support did not reach a statistically significant level of indirect association with depressive symptoms ( $\beta$ =0.054, 95% CI [-0.022,0.139]). These results indicate that receiving emotional support, failure to provide help/unsympathetic behaviour, and rejection or neglect fully mediated the relationship between giving social support and depressive symptoms. Notably, the mediating effect size of receiving emotional support accounted for

Variables	Mo	Model I		odel 2	Mo	odel 3	Mo	del 4	Mo	del 5
Outcome		GI		G3		G5		G6	GDS	
Predictor	β	t	β	t	β	t	β	t	β	t
Constant	2.276	1.516	2.374	1.165	11.472	4.437***	6.536	4.228***	9.466	3.531***
Gender	-0.028	-0.076	0.433	0.861	0.279	0.438	0.240	0.628	0.749	1.203
Religion	-0.142	-0.384	0.584	1.162	-1.633	-2.561*	-0.923	-2.422*	0.341	0.538
Age (Years)	-0.856	-3.201**	-0.772	-2.126*	1.250	2.714**	0.091	0.330	-0.056	-0.121
Marital status	0.875	2.303*	0.042	0.082	0.336	0.513	-0.416	-1.063	-0.598	-0.921
Number of living children	0.406	1.417	1.165	2.997**	-1.308	-2.656**	-0.326	-1.106	-0.506	-1.027
Education level	0.221	0.940	0.070	0.219	0.178	0.442	-0.064	-0.265	0.333	0.843
Monthly household income	0.069	0.273	0.345	1.009	-0.813	-1.877	-0.282	-1.089	-0.798	-I.878
(Yuan)										
Disability duration (Years)	0.381	1.613	0.495	1.541	-0.738	-1.813	-0.582	-2.392	-0.427	-1.058
Number of chronic diseases	-0.049	-0.158	-0.126	-0.301	0.540	1.017	0.138	0.435*	0.555	1.070
GS	0.355	5.403***	0.964	10.810***	-0.414	-3.658***	-0.217	-3.203**	-0.243	-I.807
GI									0.152	1.298
G3									-0.213*	-2.420
G5									0.190**	2.619
G6									0.362**	3.022
R <sup>2</sup>	0.187		0.417		0.183		0.103		0.288	
F	5.6	04***	17.	438***	5.4	76***	2.7	<b>′9</b> 3**	6.95	50***

Table 3 Regression Results of Mediating Effects (n-255	Table	3	Regression	Results	of	Mediating	Effects	(n=255
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Notes: GS, giving support; G1, receiving information support; G3, receiving emotional support; G5, failure to obtain help and unsympathetic behaviour; G6, rejection or neglect, GDS, depressive symptoms. \*p<0.05, \*\*p<0.01, \*\*\*p<0.001.



Figure 2 Coefficients of the mediator model. Note. \*p<0.05, \*\*p<0.01, \*\*\*p<0.001.

56.63% of the total indirect effect, while failure to obtain help/unsympathetic behaviour, and rejection or neglect accounted for 21.55% and 21.83% of the total indirect effect, respectively.

In this study, Hypothesis 2 contains six subhypotheses. The outcomes of statistical testing revealed that three of these subhypotheses garnered support from the data, whereas the remaining three failed to attain significance thresholds. As a result, we can affirm that Hypothesis 2 is partially upheld in this study. Specifically, the subhypotheses concerning the three mediating roles of receiving emotional support, failure to provide help/unsympathetic behavior, and rejection or neglect in the relationship between providing support and depressive symptoms have been empirically validated.

#### Moderated Mediation Analyses

Model 7 in the SPSS PROCESS macro was used to test the moderating effects of ADL, controlling for covariates, and to further examine the moderated mediation effect of different dimensions of receiving social support at varying levels of ADL on the relationship between giving social support and depressive symptoms. As shown in Table 5, the interaction term between giving social support and ADL was statistically significant in indicating receiving emotional support ( $\beta$ =-0.008,

Pathway	Effect	Boot SE	Boot LLCI	Boot ULCI	Effect Size
Total	-0.551	0.119	-0.785	-0.318	-
Direct	-0.243	0.135	-0.509	0.022	-
Total indirect	-0.308	0.085	-0.487	-0.155	100%
Ind1:GS→G1→GDS	0.054	0.041	-0.022	0.139	-
Ind2:GS→G3→GDS	-0.205	0.089	-0.392	-0.039	56.63%
Ind3:GS→G5→GDS	-0.078	0.037	-0.159	-0.016	21.55%
Ind4:GS→G6→GDS	-0.079	0.036	-0.160	-0.019	21.83%

**Notes:** GS, giving support; Ind1-Ind4, indirect pathway 1-indirect pathway 4; G1, receiving information support; G3, receiving emotional support; G5, failure to obtain help and unsympathetic behaviour; G6, rejection or neglect, GDS, depressive symptoms. The mediating effects were adjusted for gender, age (years), education level, religion, marital status, number of living children, monthly household income (Yuan), number of chronic diseases and disability duration.

Variables	Model I		Model 2		Mo	del 3	Model 4	
Outcome	C	53	(	G5	(	G6	G	DS
Predictor	β	t	β	t	β	t	β	t
Constant	9.283	4.679***	7.591	3.032**	4.472	2.975**	8.309	3.093**
Gender	0.484	0.975	0.338	0.539	0.178	0.473	0.727	1.165
Religion	0.509	1.026	-1.430	-2.283	-0.886	-2.357*	0.290	0.459
Age (Years)	-0.66 I	-I.847	1.077	2.384*	0.013	0.047	-0.149	-0.324
Marital status	-0.195	-0.381	0.711	1.100	-0.250	-0.645	-0.465	-0.725
Number of living children	1.198	3.143**	-1.369	-2.846**	-0.348	-1.205	-0.498	-1.010
Education level	0.069	0.221	0.138	0.348	-0.056	-0.235	0.364	0.922
Monthly household income (Yuan)	0.247	0.727	-0.595	-1.390	-0.225	-0.876	-0.805	-1.891
Disability duration (Years)	0.362	1.135	-0.650	-1.614	-0.467	-1.931	-0.392	-0.972
Number of chronic diseases	-0.286	-0.691	0.717	1.374	0.264	0.841	0.554	1.068
GS	0.924	9.805***	-0.293	-2.478*	-0.198	-2.781**	-0.228	-I.724
ADL	0.021	1.777	-0.047	-3.169**	-0.012	-1.348		
Interaction <sup>#</sup>	-0.008	-2.005*	0.003	0.648	0.007	2.427*		
G3							-0.170	-2.081*
G5							0.191	2.576*
G6							0.363	3.029**
R <sup>2</sup>	0.444		0.229		0.146		0.283	
F	16.096**	*	5.982***		3.435***		7.335***	

Table 5 Moderat	ing Effect	Analysis	of ADL	on the	Relationship	Between	Giving	Social	Support	and	Receiving
Social Support (n	=255)										

**Notes**: Interaction<sup>#</sup>, refers to the interaction of GS and ADL; GS, giving support; G3, receiving emotional support; G5, failure to obtain help and unsympathetic behaviour; G6, rejection or neglect, GDS, depressive symptoms. \*p<0.05, \*\*p<0.01, \*\*\*p<0.01.

p=0.046) and rejection or neglect ( $\beta$ =0.007, p=0.016). This indicates that ADL moderated the relationship between giving social support and receiving emotional support, as well as rejection or neglect. However, the interaction term between giving social support and ADL did not have a statistically significant indicative effect on failure to obtain help and unsympathetic behaviour ( $\beta$ =0.003, p=0.517). This suggests that ADL did not moderate the relationship between giving social support, failure to obtain help, and unsympathetic behaviour. The final mediation model with moderation is shown in Figure 3.

In conclusion, based on the validation of the three subhypotheses within hypothesis 2, this study further demonstrates that two of the subhypotheses within hypothesis 3 exhibit statistical significance. Specifically, our findings indicate that ADL plays a notable moderate role in the providing social support and receiving emotional support, as well as in mediating the relationship between providing social support and rejection or neglect.

Figure 4 shows the results of the simple slope analysis. For disabled older adults with better abilities to perform ADL (ie, high ADL), the association between giving social support and receiving emotional support was direct and significant ( $\beta_{simple}=0.751$ , p<0.001). This association was even stronger for those with lower ADL abilities ( $\beta_{simple}=1.097$ , p<0.001). As shown in Figure 5, there was no significant association between giving social support and encountering rejection or neglect for disabled older adults with high ADL ( $\beta_{simple}=-0.047$ , p=0.588). In contrast, this association was significant and negative for disabled older adults with low ADL ( $\beta_{simple}=-0.349$ , p<0.001).

To further verify the validity of the mediated effect of moderation, this study primarily referred to the research method proposed by Zhonglin et al  $(2006)^{42}$ , and used PROCESS Model 7 to test the mediated effect of moderation in the pathways involving receiving emotional support and experiencing rejection or neglect. As shown in Table 6, the mediating effect of moderation in the pathway of 'giving social support - receiving emotional support - depressive symptoms was not significant (Index=0.001, Boot SE=0.001, 95% CI [-0.0001,0.0038]). This indicates that ADL did not mediate the relationship between giving social support and depressive symptoms through receiving emotional support. In



Figure 3 Coefficients of the moderated mediation model. Note: p<0.05, \*\*p<0.01, \*\*\*p<0.01.



Figure 4 Simple slope diagram of the moderating effects of ADL on the giving support and receiving emotional support.

contrast, the mediating effect of ADL in the pathway of "giving social support - rejection or neglect - depressive symptoms" was significant (Index=0.003, Boot SE=0.002, 95% CI [0.0003,0.0067]). This indicates that ADL moderated the mediating role of rejection or neglect in the relationship between giving social support and depressive symptoms in



Figure 5 Simple slope diagram of the moderating effects of ADL on the giving support and rejection or neglect.

disabled older adults. Notably, the negative mediating effect of rejection or neglect was significant for older adults with low ADL (indirect effect = -0.131, 95% CI [-0.267, -0.033]). For those with high ADL, the negative mediating effect was not significant (indirect effect = -0.015), 95% CI [-0.080, 0.056]). The mediation effect was more pronounced for those with poorer daily living skills compared to those with better daily living skill levels (indirect effect = -0.015, 95% CI [-0.014, 0.283]).

In this study, AMOS version 24.0 was employed to validate the moderated mediation model. The model fit results were as follows:  $\chi^2/df = 1.962$ , NFI = 0.873, IFI = 0.933, TLI = 0.913, CFI = 0.932, GFI = 0.887, AGFI = 0.843, RMSEA = 0.062. These results indicate that the model fit is acceptable.

### Discussion

The results of this study reveal that the community-dwelling disabled older adults scored 6.14 (SD=2.67) on giving social support, which is less than 40% of the total score. This score is relatively low, with higher scores found for giving

Pathway	Moderator	Indirect Mediation	95% CI	Index of Moderated Mediation		
		Effect		Index	95% CI	
GS→G3→GDS	Low ADL	-0.186	(-0.373,-0.018)	0.001	(-0.0001,0.0038)	
	High ADL	-0.128	(-0.268,0.011)			
	Inter-group difference (High-Low)	0.059	(-0.005,0.162)			
GS→G6→GDS	Low ADL	-0.131	(-0.267,-0.033)	0.003	(0.0003,0.0067)	
	High ADL	-0.015	(-0.080,0.056)			
	Inter-group difference (High-Low)	-0.015	(0.014,0.283)			

Table 6 The Moderated	Mediation	Effect	Analysis	(n=255)
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Notes: GS, giving support; G3, receiving emotional support; G6, rejection or neglect, GDS, depressive symptoms.

companionship and emotional support and the lowest score for giving instrumental support. This suggests that the social support given by disabled older adults is predominantly intangible, with less substantive help provided. This is consistent with the ability characteristics of disabled older adults. Due to physical decline or illness, older adults with disabilities often encounter mobility limitations and reduced physical strength, preventing them from undertaking high-intensity physical activities or offering tangible assistance. As a result, they gravitate towards expressing support through intangible means, such as verbal encouragement and emotional exchanges. Secondly, the score for positive social support received by the disabled older adults was 23.19 (SD=6.64), approximately 50% of the total score, while the score for negative social support was 10.04 (SD=7.35), approximately 25% of the total score. Disabled older adults received more positive than negative social support, consistent with previous studies on positive and negative social support among older adults in Indonesia.<sup>43</sup> From the perspective of role theory, due to the dual disadvantaged roles of being both older adults and disabled, disabled older adults often receive more respect and care in social interactions as others adhere to these role expectations. This results in them receiving more positive social support and less negative social support. Finally, the depressive symptoms score of disabled older adults was 6.66 (SD=4.86), with a prevalence of depressive symptoms of 52.94%, higher than reported in previous studies of the general older adult population.<sup>44</sup> This increased risk of depressive symptoms is likely related to the impaired physical functioning and narrowed social circles of disabled older adults, making them prone to feelings of inferiority, helplessness, and loneliness.<sup>45</sup>

Additionally, there were significant differences in depressive symptoms among older adults based on per capita monthly household incomes and ADL abilities. Older adults with lower per capita monthly income and poorer ADL abilities exhibited more pronounced depressive symptoms, consistent with previous research findings.<sup>46,47</sup> This observation can be explained by the social capital network theory, which suggests that socio-economic backgrounds influence the strength of social connections and accessible social resources. Individuals with higher socio-economic status tend to have more extensive social networks, stronger social ties, and greater access to social resources, thereby enabling them to receive more social support.<sup>48</sup> Older adults with better economic conditions have more opportunities for social participation and interaction, contributing to their well-being.<sup>49</sup>

It is worth noting that the social support given by disabled older adults is directly correlated with the "unwanted advice or intervention" they receive (a form of negative social support). In other words, the more support disabled older adults provide to others, the more likely they are to encounter "unwanted advice or intervention". Their behaviour of giving or sacrificing can be interpreted as proactive engagement with others or assuming social responsibility, potentially alleviating the burden on caregivers and those around them. However, this behaviour might also be perceived as imposing a burden on the recipients. In Chinese culture, which values filial piety, emphasises respect, care, and support for their elders, and encourages sympathy for the weak and an altruistic spirit, recipients of support from disabled older adults may politely decline their offers out of goodwill. However, such rejections may be misinterpreted by older adults as a denial or lack of trust in their abilities, thereby exacerbating their sense of receiving "unwanted advice or intervention". This phenomenon could stem from differing biases in information exchange between younger generations and older adults.<sup>50</sup>

Furthermore, a correlation was found between depressive symptoms and the receipt of instrumental support. Receiving material help from others can be a burden for older adults with sufficient financial means, as it can threaten their perceived independence and autonomy, leading to negative emotions.<sup>51</sup> It has also been argued that excessive support from their children can disrupt the parents' role orientation, resulting in adverse psychological outcomes.<sup>27</sup> On the other hand, emotional support and informational support are adversely correlated with depressive symptoms. Specifically, emotional support enhances emotional security and reduces loneliness, thus alleviating depressive symptoms.<sup>52</sup> Information support provides older patients with disease knowledge, boosts their confidence, and promotes a healthy lifestyle, thereby reducing depressive symptoms.<sup>53</sup>

The mediation analysis found that receiving emotional support fully mediated the relationship between giving social support and depressive symptoms. Specifically, greater levels of support given to others by disabled older adults were associated with increased emotional support received, which in turn was linked to less severe depressive symptoms. Previous research supports this finding, showing that providing support to others can significantly enhance the provider's well-being.<sup>54</sup> Providing social support increases a person's sense of social connection, crucial for maintaining

interpersonal relationships and overall health.<sup>55</sup> In this study, the mediating role of receiving emotional support is consistent with previous findings.<sup>56</sup> Although the social support provided by older adults is predominantly emotional, supplemented by other forms of support, helping others in any capacity can evoke positive emotions such as pride, achievement, or fulfilment.<sup>57</sup> Moreover, it can elicit gratitude and care from others through their interactions, leading to increased emotional support and psychological satisfaction, which further alleviates depressive symptoms. Furthermore, it can also be argued that by giving emotional comfort to others, disabled older adults not only increase the social support they receive, especially emotional support, but also promote their psychological well-being, such as a reduction in depressive symptoms. From the perspective of equity theory, receiving too much or too little benefit can cause stress.<sup>58</sup> Therefore, maintaining a balance between giving and receiving support helps reduce the psychological burden on older adults, thereby enhancing their sense of happiness.

This study's results revealed that failure to obtain help/unsympathetic behaviour, and rejection or neglect (negative social support) fully mediated the relationship between giving social support and depressive symptoms. In particular, disabled older adults who give more social support to others tend to experience less failure to obtain help/unsympathetic behaviour, and rejection or neglect, which ultimately leads to reduced depressive symptoms. These two negative aspects of social support are significant stressors for older adults and have been shown in previous research to have a detrimental impact on mental health, increasing emotional distress and the risk of depressive symptoms.<sup>59</sup> By giving social support, older adults can reduce negative emotions such as depressive symptoms by reducing the stress caused by negative social interactions. As previously discussed, social exchanges often adhere to the principle of reciprocity. Disabled older adults who offer social support, assistance, and care to others engage in proactive behaviours that may evoke a desire for reciprocation in the recipients. This, in turn, decreases the likelihood of negative sentiments being directed towards disabled older adults.

Additionally, in terms of the mediating effect size, giving social support to disabled older adults most strongly influenced their depressive symptoms through receiving positive emotional support (56.63% of the effect sizes). At the same time, failure to obtain help and unsympathetic behaviour, as well as rejection or neglect, had smaller effects (21.55% and 21.83%, respectively). This may be attributed to older adults' tendency to process information more positively in memory.<sup>60</sup> Furthermore, the filial piety culture in China encourages young people to respect and care for older adults. As a marginalised and vulnerable group, disabled older adults may experience more positive social interactions and fewer negative interactions when providing social support to others. It is also possible that some respondents downplayed the effects of negative interactions due to the influence of primarily interacting with family members and the concept of "keeping family shame within the family". Although previous studies have indicated that negative social interactions are more likely to cause emotional distress than positive ones, as they go against the expectations of family and friends and are more strongly associated with depressive symptoms among older adults.<sup>24,61</sup> these studies did not specify the frequency of positive and negative interactions. It is plausible that if positive and negative interactions occur at the same frequency, the adverse role of negative interactions might be more pronounced. In the present study, the frequency of positive interactions was higher than that of negative interactions, which may account for the differences observed. This calls for further investigation in future research. Furthermore, the adverse impact of negative support or interactions during social engagement can be mitigated by positive interactions, further amplifying the beneficial effects of positive social support.<sup>62</sup>

However, not all support provided to others benefits the giver. Only when the receiver appreciates or acknowledges the support does it increase the giver's sense of well-being. Conversely, unrecognised support fails to benefit the provider.<sup>63</sup> Therefore, when disabled older adults offer emotional or verbal support to their family members or caregivers, it is important for the receivers to provide appropriate positive feedback and support in return, which benefits the older adults' health.

The moderating effect test, shown in Table 4, revealed that ADL moderated the relationship between giving social support and receiving emotional support, as well as between giving social support and rejection or neglect. This may be because older adults with lower daily living abilities require more care and companionship, thereby receiving more attention. When they provide help or support to others, they experience less rejection or neglect. Table 5 indicates that the mediating role of rejection or neglect between giving social support and depressive symptoms varied with differing levels

of ADL. In contrast, the mediating role of receiving emotional support between giving social support and depressive symptoms did not vary by ADL level. This may be because older adults who have been disabled for a long time have stabilised their experiences of receiving positive social support, regardless of their ability to perform daily living tasks. Disabled older adults, as the primary care recipients, especially those with lower daily living abilities, experience less rejection or neglect when they provide more social support. Additionally, older adults with higher ADL levels often desire to maintain independence and are less inclined to accept support rooted in filial piety, primarily from their children. Conversely, those with lower ADL levels tend to accept more filial piety support and exhibit fewer negative emotions as a result.<sup>64</sup>

In conclusion, disabled older adults who give support to others and realise their self-worth tend to receive more support and experience less stress associated with negative communication. While older adults with poorer ADL may offer less social support than those with better ADL, they benefit more from giving and receiving social support.

### **Strengths and Limitations**

Our study, guided by social exchange theory and equity theory, examines the social interactions of disabled older adults in China, particularly their giving and receiving of social support, and the impact on depressive symptoms. In contrast to previous research, we offer a unique perspective by examining the role of social support given by physically frail or disabled older adults. Our findings reveal that even disabled older adults can provide social support to others, primarily in the form of intangible support such as emotional support. Furthermore, in terms of receiving support, we have considered the role of negative social support, including indifference, rejection, or neglect, alongside positive support. The results confirm that receiving social support plays a mediating role between giving support and the depressive symptoms, and furthermore, ADL plays a more significant role in moderating the relationship between giving social support and receiving social support. Additionally, this study has practical implications, as the proposed moderated mediation model serves as a valuable framework for developing interventions to alleviate and manage depressive symptoms among older adults.

This study has several limitations that warrant attention. Firstly, the study participants were drawn exclusively from a single province, Zhejiang. Zhejiang Province, which has the second largest migrant population in the country, includes migrants from all provinces. This population accounts for approximately 30% of the total immigrant population in Wenzhou and Jiaxing. While the sample of older adults can somewhat reflect the social interaction characteristics of most older adults in the country, cultural and socio-economic differences between provinces and cities in China warrant multicentre sampling in future research. Secondly, social exchange theory suggests a potential bidirectional relationship between giving and receiving social support. However, as this study is cross-sectional, it cannot establish a causal link between giving and receiving social support and depressive symptoms. Thirdly, this study did not separately analyse the types of social support given by disabled older adults or their specific impact on depressive symptoms. Fourthly, the relatively small sample size potentially limited its ability to fully capture the diversity within a broader context. Additionally, the limited sample size prevented subgroup analyses based on varying levels of ADL capabilities, which could potentially be a confounding factor in interpreting the results. Future research should consider longitudinal studies, increasing the sample size, or employing more sophisticated statistical methods to dig deeper into these issues. Lastly, our study was confined to disabled older adults residing in communities. It is plausible that institutionalised disabled older adults may exhibit different patterns of giving and receiving social support. Therefore, future studies should consider researching disabled older adults across various living environments.

### Conclusion

This study employs a moderated mediation model to examine the relationship between social support provided by disabled older adults and their depressive symptoms. It explored the mediating role of received social support in this relationship, as well as the partial moderating effect of ADL capacity, providing insights into the mechanisms underlying depressive symptoms among disabled older adults in the community. The results indicate that providing social support to others influences the levels of depressive symptoms in disabled older adults through different pathways associated with receiving social support. Specifically, negative social support plays a mediating role, while the mediating effect of

positive social support is more pronounced. Consequently, policymakers and decision-makers should enhance training and education to emphasise the importance of both providing and receiving positive social support during social interactions with disabled older adults, especially for their primary caregivers. As the person with the most frequent contact, caregivers should proactively address the support needs of disabled older adults, encourage such support with positive feedback, demonstrate respect and understanding, and minimise negative interactions like criticism and neglect. For older adults with lower ADL capabilities, caregivers should particularly encourage them to offer support within their limitations, foster social engagement, strengthen social ties, and promote mental well-being.

### **Data Sharing Statement**

All data in the current study can be obtained from the corresponding authors through their Email addresses upon reasonable request.

# **Ethical Statement**

This study received the ethical review approval of the Ethics Committee of the Wenzhou Medical University (Ethical Review No. 2020-107). The respondents were informed of the nature of the survey, and informed consent was obtained before conducting the survey. All participants were assured anonymity, confidentiality, and the right to withdraw at any time. All procedures were conducted in accordance with the principles of the Declaration of Helsinki.

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### **Author Contributions**

All authors made significant contributions to the work reported, whether in conception, study design, execution, data acquisition, analysis, interpretation, or all these areas. They took part in drafting, revising, and critically reviewing the article, gave final approval of the published version, agreed on the journal for submission, and agreed to be accountable for all aspects of the work. Additionally, Yi Fang and Yuqi Jiang should both be regarded as co-first authors.

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# Disclosure

The authors report no conflicts of interest in this work.

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